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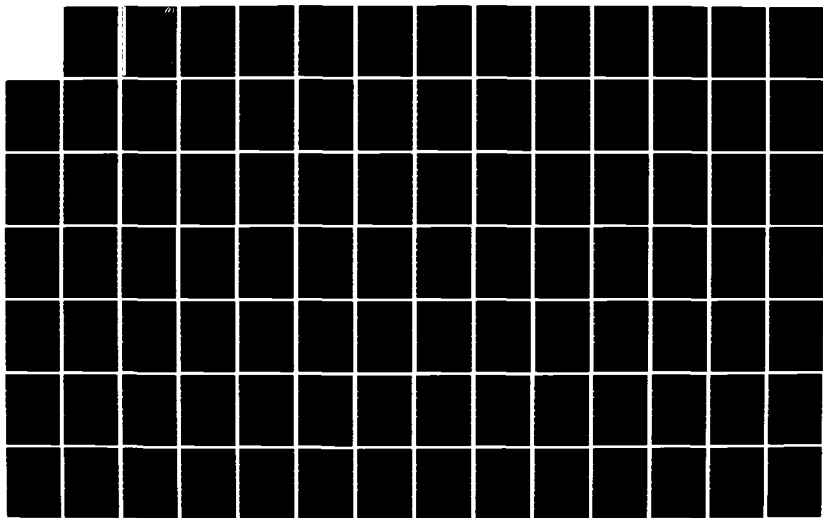
SUBBANDING CHARGE TRANSPORT AND RELATED APPLICATIONS IN
SEMICONDUCTOR DEVICES(U) HAWAII UNIV AT MANOA HONOLULU
DEPT OF ELECTRICAL ENGINEERING... J W HOLM-KENNEDY
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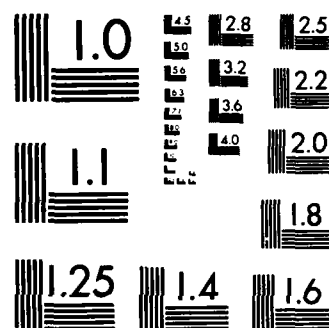
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UNIVERSITY OF HAWAII

COLLEGE OF ENGINEERING

ANNUAL REPORT

SUBBANDING, CHARGE TRANSPORT AND RELATED APPLICATIONS
IN SEMICONDUCTOR DEVICES

J. W. HOLM-KENNEDY
PRINCIPAL INVESTIGATOR

Sponsored by the Department of the Navy
Office of Naval Research
Under Contract No. N00014-76-C-1081

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IN SEMICONDUCTOR DEVICES

J. W. Holm-Kennedy
Principal Investigator

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University of Hawaii
College of Engineering
Department of Electrical Engineering

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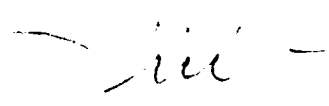
100 meV is to be expected for n-Si of appropriate surface orientation and doping concentration. Even larger separations may be expected for various compound semiconductors. The Fermi level has been calculated for different channel dopings at 4.2K, 77K and 300K. The channels are shown to be degenerate under certain conditions in spite of the fact that a 3D system would be non-degenerate at the same temperature and concentration.

Theory is presented for transverse voltage amplifying devices. This structure constitutes a new class of semiconductor devices.

ABSTRACT

The project is concerned with the investigation of quantization, charge transport and applications in two dimensional subbanding systems including MOSFET and various junction field effect configurations. The degree of subbanding to be expected in various semiconductor materials has been characterized for different channel doping densities, temperatures and surface orientation. The materials treated here are (110) and (111) Si, n-GaAs, n-InP, n-InAs and n-InSb. Results for both buried conducting channels and surface conducting channels are presented. It is noted that subband separation in excess of 100 meV is to be expected for n-Si of appropriate surface orientation and doping concentration. Even larger separations may be expected for various compound semiconductors. The Fermi level has been calculated for different channel dopings at 4.2K, 77K and 300K. The channels are shown to be degenerate under certain conditions in spite of the fact that a 3D system would be non-degenerate at the same temperature and concentration.

Theory is presented for transverse voltage amplifying devices. This structure constitutes a new class of semiconductor devices.

FOREWORD

This is the first annual report for ONR contract N0014-76-C-1081 sponsored by the Office of Naval Research.

The personnel associated with the project this last year were Prof. J. W. Holm-Kennedy, principal investigator, and Mr. Daryl Motoda, technical assistant.

The contract supports the investigations of subbanding phenomena and related applications in various semiconductor subbanding systems. Emphasis in this report will be placed on the degree and nature of the subbanding to be expected in various semiconductors and the transverse voltage-amplifying device. Other proposed applications supported by the project will be treated at a later date.

Subbanding in Semiconductor Devices

In recent years there has been a growing activity in investigations of the physics of two dimensional subbanding in electronic devices. Heretofore the field has been limited to investigations of MIS structures with heavy emphasis on the common Si MOSFET. Although those investigations have proven fruitful, and there is still a good deal of intense activity surrounding this type of device, the MOSFET is not the only candidate for subbanding nor is it necessarily the best one for certain areas of study.

The principal investigator has proposed a completely separate and new class of two dimensional subbanding systems which promise to be more versatile in their applications. These devices use a p-n homo-junction to confine the free electronic charge in the semiconductor to conducting regions so narrow as to exhibit quantum effects (subbanding). This system is akin to the common J-FET but is designed to insure a sufficient degree of confinement to guarantee quantum effects.

The ideal band structure for a subbanding system is well known. It consists of sets of two dimensional ellipses in k-space. The subband members are separated in energy determined by the degree of confinement. For junction subbanding structures (J-SUBS), the bands in k-space will ideally have the same shape as for MOSFETs. However, J-SUBS may be expected in practice to vary markedly from the MOSFET nature. J-SUBS are more versatile and, except where an interface is used as a barrier on one side of the device, should not suffer from the presence of the SiO_2/Si interface, related surface charge and surface roughness.

Degeneracy

One effect of subbanding is to lift part of the degeneracy of the bulk three dimensional band structure. This results in finding fewer k states near the edge of the conduction (sub) band than for the 3D system. The degree of band filling is therefore stronger when electrons are introduced into the band. Fewer electrons are needed to fill all the lower states in the subband and as a result one may expect degeneracy in the two dimensional structure whereas a similarly doped three dimensional channel would exhibit non-degenerate behavior. The location of the Fermi level E_F depends on how the electrons are distributed throughout the subband and therefore on the temperature (for E_F below E_{c1}). For a parabolic 3D band, one knows that the density of states depends upon m^* ^{3/2}. In the 2D structure the density of states depends on m^* , i.e., on the mass to first power. Thus one may expect stronger degenerate effects in semiconductors having smaller effective masses, such as n-InSb and n-GaAs, than in materials with larger effective masses (such as Si). The valley degeneracy also affects the density of available states (contrast (111) n-Si with 6-fold degeneracy to n-GaAs with 1-fold degeneracy).

All of these effects may be treated quantitatively by considering the condition for conservation of carriers in the conducting channel. One can show that the population of the v^{th} subband is

$$n_v = 4 (m_{1v} m_{2v})^{1/2} \frac{kT}{h^2} \ln[e^{(E_F - E_{cv})/kT} + 1] \quad (1)$$

where m_{1v} and m_{2v} are the principle subband effective mass values in the non-confining directions, T is the temperature and E_{cv} is the subband edge for the v^{th} subband. The total number of carriers in the channel of width W_c doped at a concentration N_d is simply¹

$$n_0 (\text{cm}^{-2}) = N_d W_c . \quad (2)$$

Carrier conservation yields

$$N_d W_c = \sum_v n_v \quad (3)$$

resulting in the expression

$$\prod_{i,j} [e^{-(E_{ij}-E_F)/kT} + 1]^{\alpha_j} = e^{N_d W_c / kT} \quad (4)$$

where

$$\alpha_j = \frac{4\pi}{h^2} n_j (m_{1j} m_{2j})^{1/2} . \quad (5)$$

Here v has been replaced by i,j to illustrate the contribution from the different subband sets (j) and all of their contributing members (i). n_j is the valley degeneracy factor (e.g., $n_j=6$ for (111)-n-Si).

Several interesting observations may be made here. If only one subband is occupied and it is clearly degenerate (i.e., $[E_F - E_{v1}]/kT \gg 1$), the expression for E_F becomes

$$E_F = E_{v1} + N_d W_c / \alpha_j . \quad (6)$$

If two different subbands are degenerate and only these are occupied, one finds

$$E_F = \frac{\alpha_2 E_{c2} + \alpha_1 E_{c1}}{\alpha_2 + \alpha_1} + \frac{N_d W_c}{\alpha_1 + \alpha_2} \quad (7)$$

and so on. Thus, for such conditions E_F becomes linear in W_c . One may expect to vary the degree of degeneracy in a very controlled way (linearly in W_c) by simply controlling W_c through the variation in the depletion width with applied gate voltage. An increasing W_c is therefore expected to increase the degree of degeneracy. This effect should continue to occur until, for large W_c , the subbands become so close together that the effective density of accessible states forces again a non-degenerate condition (approaches the 3D system).

At pinchoff the channel is empty ($W_c=0$) resulting in a non-degenerate condition. Thus one has a system, which, if it exhibits degeneracy effects, may

be varied between strictly non-degenerate conditions and strongly degenerate conditions while maintaining a number of other parameters unchanged. This is in stark contrast to the MOSFET.

The J-SUBS therefore present a very interesting and versatile physical system with which to probe fundamental physical phenomena of two dimensional systems. They also afford unique applications potential.

Appendix I is the text of a paper published in the proceedings of the Second International Conference of 2D Systems (Brechtsgaden, 1977) and describes an approximate method for computing the strength of the quantum effects.

Figures 1 through 58 and the associated tables show the results of a portion of our calculations of both subband edge energies and Fermi level E_F for (110) and (111) n-Si, n-InSb, n-InAs, n-InP and n-GaAs for various channel doping and channel width. (Similar analyses applies to p-type channels.) The quantum effects can be very pronounced under appropriate conditions, being 100's of meV in some instances as compared with values on the order of 10's of meV for Si MOSFETs. Of course, if the conducting channel is located at the surface, the confinement on the surface side of the channel is usually more abrupt than on the p-n junction side naturally resulting in sharper confinement and therefore stronger quantum effects (i.e., large subband separation). The separation for abrupt surface channel device is easily shown to be the same as for the symmetric channel in the bulk with simply every other subband removed (see Appendix I).

It is observed that the degeneracy effects are strongest for the lighter mass semiconductors, as expected. With appropriate design, the Fermi level is seen to penetrate several subbands.

Transverse Voltage Amplifier Device

For particular surface orientations, the subband structure exhibits an anisotropic character. Different subband sets have different energy separations due to their different transverse effective mass values. The effective mass tensors for transport in directions parallel to the confined conducting plane differ for the different subband sets (e.g., (110)n-Si). This results in different contributions to the anisotropic transport from the different subband sets.

Because of the energy separation of the subband sets, the relative subband populations are temperature dependent. The separation is gate voltage dependent through the effect of the gate voltage V_g on the degree of confinement. The transport anisotropy results in the generation of a voltage dependent transverse voltage V_T for non-principle directions. If $\partial V_T / \partial V_g > 1$, one has a differential voltage gain.

One can write, for two valleys separated by ΔE ,

$$\frac{\partial V_T}{\partial V_g} = \frac{\partial V_T}{\partial \Delta E} \frac{\partial \Delta E}{\partial W_c} \frac{\partial W_c}{\partial V_g} \quad (8)$$

Here W_c is the conducting channel width.

For the non-degenerate case, and where we neglect screening effects, one can write

$$\frac{\partial V_T}{\partial \Delta E} = \frac{\Omega(|\Gamma_A| + |\Gamma_B|)e^{-\Delta E/kT}}{kT[1 + \Omega e^{-\Delta E/kT}]^2} \cdot V_{SD} \frac{W}{L} F\left(\frac{W}{L}\right) \quad (9)$$

$$\frac{\partial x_n}{\partial V_g} = \frac{1}{2} \frac{x_n}{(V_g + V_B)} \quad (10)$$

$$\frac{\partial \Delta E}{\partial x_n} = -2 \frac{\partial \Delta E}{\partial W_c} \quad (11)$$

$$\Omega = (m_{1B}m_{2B}/m_{1A}m_{2A})^{1/2} \quad (12)$$

$$x_n = \left[\frac{N_a}{N_d} \frac{2k_s \epsilon_0}{q} \left(\frac{1}{N_d + N_a} \right) \right]^{1/2} [V_g + V_b]^{1/2} \quad (13)$$

and,

$$|\Gamma_{A,B}| = |(\gamma_{A,B} - 1)| \left| \frac{\sin \theta_{A,B} \cos \theta_{A,B}}{\sin^2 \theta_{A,B} + \gamma_{A,B} \cos^2 \theta_{A,B}} \right| \quad (14)$$

where

$$\gamma_A = \frac{\mu_{\perp A}}{\mu_{\parallel A}}, \quad \gamma_B = \frac{\mu_{\perp B}}{\mu_{\parallel B}} \quad (15)$$

and where A and B correspond to the lower and upper subband respectively. μ_{\perp} and μ_{\parallel} are the mobility values perpendicular (\perp) and parallel (\parallel) to the ellipse principle axes. m_1 and m_2 are the "free electron tensor effective mass components, V_B is the junction built-in potential, W_c is the width of the conducting channel, L the channel length, $F(W/L)$ accounts for contact shorting effects, V_{SD} is the source to drain voltage, N_d and N_a the doner and acceptor concentrations, k_s the relative dielectric constant and x_n is the depletion width on the n side of the junction, θ_A and θ_B are the angles the channel orientation make with the A and B ellipses $\partial \Delta E / \partial x_n = -2 \partial \Delta E / \partial W_c$ is computed from the expression for E_i in Appendix I.

A more general expression can be derived to include the effects of higher subbands and the effects of degeneracy. One finds that both E_F and $E_{c,i,j}$ are functions of W_c . Analyses for the transverse voltage gain for a system with two subband sets yields

$$\frac{\partial V_T}{\partial V_g} = \frac{\partial \Gamma}{\partial V_g} \cdot \frac{W}{L} F\left(\frac{W}{L}\right) V_{SD} \quad (16)$$

$$\Gamma = \left\{ \sum_{i,j} [4|\Gamma_A|n_{Ai} - 2|\Gamma_B|n_{Bj}] / \left\{ \sum_{i,j} (n_{Ai} + n_{Bj}) \right\} \right\} \quad (17)$$

$$N_d^+ W_c = \sum_{i,j} (n_i + n_j) \quad (18)$$

$$\frac{\partial \Gamma}{\partial V_g} = \frac{\partial \Gamma}{\partial x_n} \frac{\partial x_n}{\partial V_g} \quad (19)$$

$$\frac{d\Gamma}{dx_n} = \frac{1}{B^2} [B \sum_i \frac{dA}{du_i} \frac{du_i}{dx_n} - A \sum_j \frac{dB}{du_j} \frac{du_j}{dx_n}] \quad (20)$$

$$A \equiv \sum_{i,j} [4|\Gamma_A|n_{Ai} - 2|\Gamma_B|n_{Bj}] \quad (21)$$

$$B \equiv \sum_{i,j} (n_{Ai} + n_{Bj}) \quad (22)$$

$$\frac{dA}{dx_j} = -\frac{C_A}{T} \sum_i \left[\frac{1}{e^{(E_{ci}-E_F)/kT} + 1} \frac{du_i}{dx_n} \right] + \frac{C_B}{T} \sum_j \left[\frac{1}{e^{(E_{cj}-E_F)/kT} + 1} \frac{du_j}{dx_n} \right] \quad (23)$$

$$\frac{dB}{dx_j} = -\frac{D_A}{T} \sum_i \left[\frac{1}{e^{(E_{ci}-E_F)/kT} + 1} \frac{du_i}{dx_n} \right] + \frac{D_B}{T} \sum_j \left[\frac{1}{e^{(E_{cj}-E_F)/kT} + 1} \frac{du_j}{dx_n} \right] \quad (24)$$

$$C_A \equiv 4\Gamma_A \alpha_i kT \quad (25)$$

$$C_B \equiv 2\Gamma_B \alpha_j kT \quad (26)$$

$$\alpha_i \equiv 4\pi(m_{1A}m_{2A})^{1/2}/h^2 \quad (27)$$

$$\alpha_j \equiv 4\pi(m_{1B}m_{2B})^{1/2}/h^2 \quad (28)$$

$$D_A \equiv 4kT\alpha_i \quad (29)$$

$$D_B \equiv 2kT\alpha_j \quad (30)$$

$$u_{i,j} \equiv E_{c_{i,j}} - E_F \quad (31)$$

The above applies for any doping profile. If the device has n and p regions homogeneously doped and assumes the depletion approximation, the analysis is simplified by writing

$$\frac{dx_n}{dV_g} = \frac{x_n}{2} \frac{1}{(V_B + V_G)} \quad (32)$$

where x_n is the n-depletion width. Here n_i and n_j are the populations of the i^{th} and j^{th} members of the A and B subband sets, respectively.

For convenience, only results for the non-degenerate case assuming the lowest subband member of each set only is occupied will be presented here.

By considering Eqs. (9) through (15), several observations may be made for the simple case. To maximize the gain one wants to maximize $|\Gamma_A| + |\Gamma_B|$, x_n , $\frac{\partial \Delta E}{\partial x_n}$, $\Omega e^{-\Delta E/kT} / (1 + \Omega e^{-\Delta E/kT})^2 = \frac{1}{4} \cosh^2[\frac{1}{2}(\ln \Omega + \Delta E/2kT)]$, V_{SD} , $\frac{\partial x_n}{\partial V_g}$ and $\frac{W}{L} F(W/L)$ which has a maximum value of 1. $\frac{\partial x_n}{\partial V_g}$ can be maximized by setting $V_g = 0$ and maximizing x_n/V_b . This may be accomplished via doping $N_a > N_d$ and keeping the doping light. The latter is constrained however by the prerequisite for significant subbanding (dependent upon relatively heavy doping). There is an advantage in unequal densities of states with the B subband having a larger density of states. The mobility anisotropies γ_A, γ_B should be as large as possible and $\theta_B = \frac{\pi}{2} - \theta_A$ should be chosen for maximum values of $|\Gamma_A| + |\Gamma_B|$. The temperature enters the expression in a significant way. For $kT \ll \Delta E$, $G \equiv \partial V_T / \partial V_g \rightarrow 0$. For $kT \gg \Delta E$, $G \rightarrow 0$. There is clearly an optimal relationship between ΔE and kT and the gain may be expected to be quite temperature sensitive, perhaps displaying thermometric applications potential. We have performed extensive calculations on this system. They show that a differential gain is to be expected. The results will be reported at a later date.

Our other applications-oriented work has also progressed and will be described elsewhere. Effects of subband-washout will be discussed at a later date.

Publications

Ury, I. and Holm-Kennedy, J.W., "Two Dimensional Subbanding in Junction Field Effect Structures" presented at the Second International Conference on the Electronic Properties of Two Dimensional Systems held in Brechtesgaden, West Germany, September 19-22, 1977. The paper is found in Appendix I and in the Conference proceedings. It will also be published in a forthcoming issue of Surface Science.

Figures

The figures are representative of the subbanding study. The degree of subbanding is displayed as a function of device parameters and temperature. Following each figure is a set of tables showing the subband energies in meV, the Fermi energy in meV, and the relative subband populations at various channel widths (\AA). The calculations do not include the effects of screening.

The second set of figures show the differential transverse voltage gain for the Transverse Electric Field Field Effect Transistor (TEFFET) for various device parameters and temperature. It is noted that impurity band effects may be present and affect the mobility anisotropies. Also, any condensation effects have been ignored although they are expected to be present at low temperatures in some cases. Additional details may be added to the calculations at some future time.

GRAPH OF ENERGY LEVELS VS. WC

NS1/111

DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

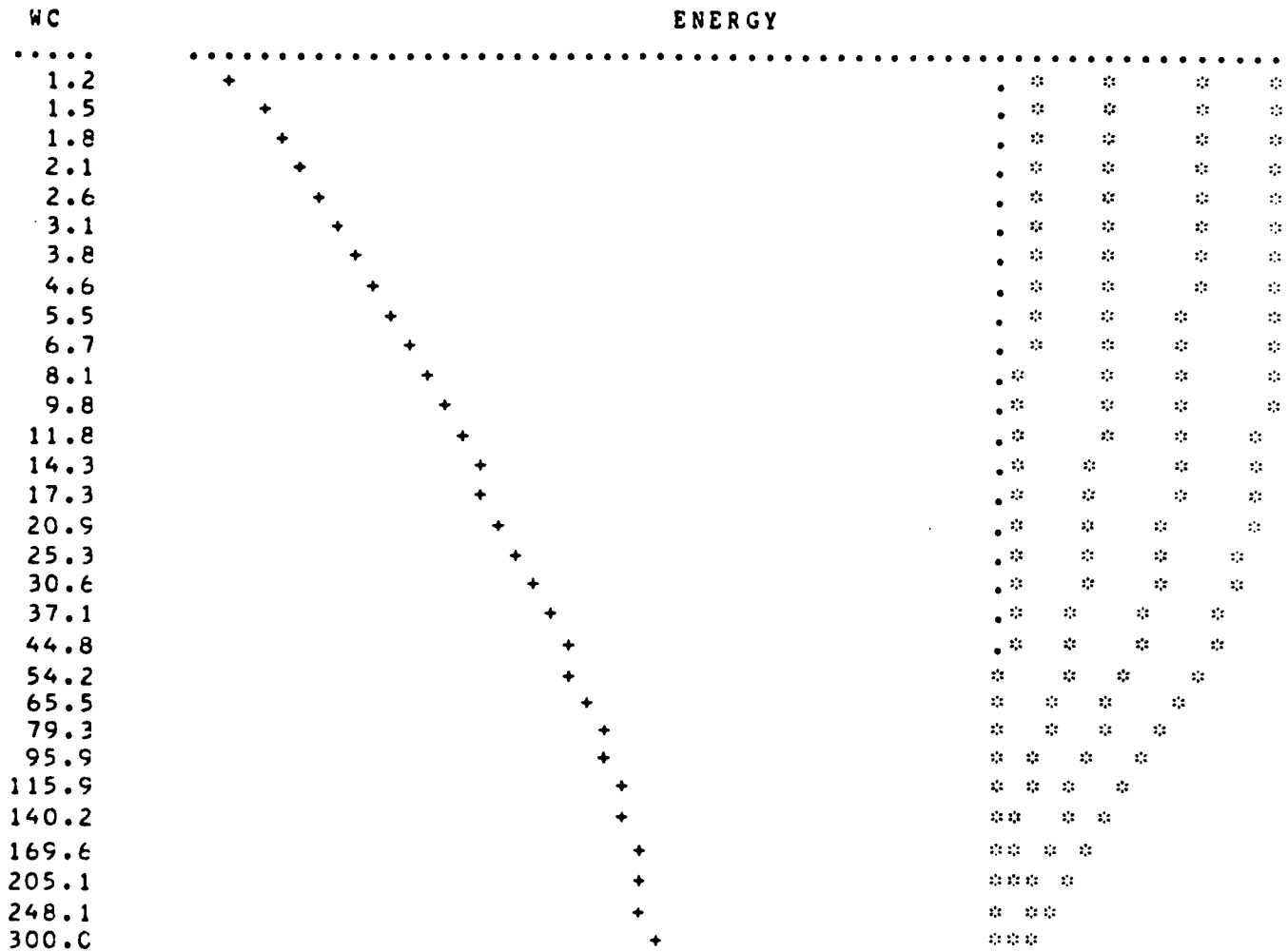


Figure 1

w_c (Å)	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-199.932	10.423	31.543	52.712	73.903	95.106
1.5	-195.085	10.378	31.464	52.611	73.782	94.969
1.8	-190.252	10.324	31.369	52.488	73.636	94.803
2.1	-185.435	10.258	31.254	52.339	73.461	94.603
2.6	-180.638	10.180	31.117	52.160	73.248	94.362
3.1	-175.865	10.086	30.951	51.945	72.992	94.072
3.8	-171.120	9.974	30.751	51.685	72.684	93.721
4.6	-166.409	9.840	30.512	51.373	72.313	93.299
5.5	-161.738	9.680	30.225	50.998	71.867	92.791
6.7	-157.115	9.491	29.881	50.549	71.331	92.181
8.1	-152.549	9.267	29.471	50.010	70.688	91.448
9.8	-148.049	9.003	28.983	49.367	69.919	90.569
11.8	-143.628	8.694	28.403	48.600	69.000	89.518
14.3	-139.296	8.336	27.718	47.689	67.904	88.263
17.3	-135.069	7.923	26.912	46.610	66.603	86.770
20.9	-130.962	7.453	25.971	45.339	65.064	84.998
25.3	-126.989	6.924	24.878	43.851	63.252	82.905
30.6	-123.166	6.340	23.621	42.118	61.129	80.445
37.1	-119.509	5.706	22.191	40.119	58.663	77.571
44.8	-116.031	5.035	20.587	37.836	55.819	74.240
54.2	-112.745	4.344	18.816	35.262	52.576	70.412
65.5	-109.661	3.655	16.900	32.403	48.926	66.065
79.3	-106.785	2.994	14.877	29.288	44.880	61.196
95.9	-104.124	2.386	12.801	25.968	40.481	55.831
115.9	-101.676	1.850	10.740	22.526	35.807	50.042
140.2	-99.439	1.398	8.771	19.068	30.977	43.945
169.6	-97.398	1.033	6.968	15.720	26.145	37.710
205.1	-95.528	.749	5.386	12.607	21.486	31.547
248.1	-93.785	.534	4.060	9.836	17.176	25.686
300.0	-92.105	.377	2.993	7.477	13.360	20.341

Table 1A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	116.317	137.534	158.756	179.982	201.211
1.5	116.165	137.369	158.579	179.793	201.011
1.8	115.982	137.170	158.365	179.565	200.770
2.1	115.761	136.929	158.106	179.290	200.479
2.6	115.494	136.639	157.794	178.957	200.127
3.1	115.172	136.289	157.417	178.556	199.702
3.8	114.784	135.866	156.963	178.071	199.190
4.6	114.316	135.357	156.415	177.488	198.572
5.5	113.753	134.743	155.755	176.784	197.827
6.7	113.076	134.005	154.960	175.937	196.931
8.1	112.262	133.118	154.005	174.918	195.851
9.8	111.286	132.053	152.858	173.693	194.554
11.8	110.117	130.776	151.481	172.224	192.997
14.3	108.720	129.249	149.834	170.463	191.130
17.3	107.055	127.426	147.865	168.359	188.898
20.9	105.075	125.257	145.520	165.849	186.232
25.3	102.731	122.683	142.734	162.864	183.060
30.6	99.968	119.644	139.438	159.329	179.298
37.1	96.730	116.072	135.557	155.158	174.854
44.8	92.959	111.900	131.013	150.265	169.632
54.2	88.606	107.065	125.730	144.562	163.533
65.5	83.631	101.512	119.641	137.969	156.464
79.3	78.014	95.208	112.696	130.422	148.346
95.9	71.770	88.149	104.876	121.886	139.130
115.9	64.954	80.379	96.210	112.372	128.812
140.2	57.679	71.999	86.786	101.958	117.453
169.6	50.118	63.182	76.773	90.803	105.203
205.1	42.505	54.174	66.424	79.162	92.316
248.1	35.111	45.280	56.069	67.383	79.151
300.0	28.216	36.834	46.084	55.880	66.153

Table 1B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.11267E 10	.49765E 9	.21937E 9	.96619E 8	.42535E 8
1.5	.13615E 10	.60213E 9	.26566E 9	.11710E 9	.51582E 8
1.8	.16448E 10	.72861E 9	.32182E 9	.14197E 9	.62589E 8
2.1	.19867E 10	.88177E 9	.38999E 9	.17223E 9	.75998E 8
2.6	.23991E 10	.10673E 10	.47279E 9	.20907E 9	.92357E 8
3.1	.28960E 10	.12920E 10	.57345E 9	.25398E 9	.11235E 9
3.8	.34946E 10	.15644E 10	.69597E 9	.30883E 9	.13683E 9
4.6	.42149E 10	.18946E 10	.84527E 9	.37594E 9	.16690E 9
5.5	.50805E 10	.22952E 10	.10275E 10	.45825E 9	.20393E 9
6.7	.61197E 10	.27813E 10	.12503E 10	.55950E 9	.24971E 9
8.1	.73649E 10	.33717E 10	.15233E 10	.68443E 9	.30654E 9
9.8	.88539E 10	.40891E 10	.18586E 10	.83921E 9	.37745E 9
11.8	.10630E 11	.49617E 10	.22718E 10	.10319E 10	.46648E 9
14.3	.12742E 11	.60239E 10	.27825E 10	.12729E 10	.57903E 9
17.3	.15243E 11	.73177E 10	.34164E 10	.15765E 10	.72248E 9
20.9	.18190E 11	.88950E 10	.42064E 10	.19614E 10	.90702E 9
25.3	.21641E 11	.10819E 11	.51957E 10	.24533E 10	.11470E 10
30.6	.25651E 11	.13165E 11	.64406E 10	.30876E 10	.14625E 10
37.1	.30266E 11	.16022E 11	.80148E 10	.39129E 10	.18829E 10
44.8	.35513E 11	.19496E 11	.10014E 11	.49964E 10	.24504E 10
54.2	.41370E 11	.23696E 11	.12558E 11	.64313E 10	.32266E 10
65.5	.47856E 11	.28736E 11	.15799E 11	.83441E 10	.43010E 10
79.3	.54825E 11	.34707E 11	.19910E 11	.10903E 11	.58029E 10
95.9	.62161E 11	.41653E 11	.25078E 11	.14323E 11	.79142E 10
115.9	.69700E 11	.49541E 11	.31471E 11	.18855E 11	.10881E 11
140.2	.77268E 11	.58233E 11	.39191E 11	.24767E 11	.15014E 11
169.6	.84726E 11	.67492E 11	.48223E 11	.32282E 11	.20666E 11
205.1	.92005E 11	.77039E 11	.58401E 11	.41510E 11	.28173E 11
248.1	.99149E 11	.86645E 11	.69445E 11	.52390E 11	.37763E 11
300.0	.10636E 12	.96245E 11	.81074E 11	.64705E 11	.49484E 11

Table 1C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.18719E	8	.82365E	7	.36235E	7	.15940E	7	.70127E	6
1.5	.22714E	8	.99992E	7	.44010E	7	.19369E	7	.85238E	6
1.6	.27580E	8	.12149E	8	.53501E	7	.23558E	7	.10372E	7
2.1	.33516E	8	.14775E	8	.65110E	7	.28687E	7	.12638E	7
2.6	.40771E	8	.17989E	8	.79343E	7	.34985E	7	.15424E	7
3.1	.49656E	8	.21934E	8	.96838E	7	.42740E	7	.18859E	7
3.8	.60566E	8	.26739E	8	.11842E	8	.52324E	7	.23112E	7
4.6	.74005E	8	.32785E	8	.14514E	8	.64222E	7	.28405E	7
5.5	.90618E	8	.40223E	8	.17839E	8	.79066E	7	.35025E	7
6.7	.11125E	9	.49496E	8	.22000E	8	.97704E	7	.43364E	7
8.1	.13699E	9	.61125E	8	.27240E	8	.12128E	8	.53950E	7
9.8	.16932E	9	.75811E	8	.33893E	8	.15135E	8	.67516E	7
11.8	.21022E	9	.94514E	8	.42418E	8	.19010E	8	.85091E	7
14.3	.26238E	9	.11856E	9	.53459E	8	.24062E	8	.10815E	8
17.3	.32958E	9	.14984E	9	.67942E	8	.30743E	8	.13886E	8
20.9	.41711E	9	.19103E	9	.87213E	8	.39715E	8	.18047E	8
25.3	.53260E	9	.24610E	9	.11328E	9	.51984E	8	.23794E	8
30.6	.68717E	9	.32094E	9	.14921E	9	.69108E	8	.31911E	8
37.1	.89730E	9	.42453E	9	.19974E	9	.93557E	8	.43659E	8
44.8	.11877E	10	.57076E	9	.27244E	9	.12934E	9	.61134E	8
54.2	.15962E	10	.78149E	9	.37955E	9	.18315E	9	.87902E	8
65.5	.21802E	10	.10916E	10	.54129E	9	.26634E	9	.13021E	9
79.3	.30280E	10	.15570E	10	.79150E	9	.39864E	9	.19923E	9
95.9	.42733E	10	.22678E	10	.11873E	10	.61483E	9	.31548E	9
115.9	.61140E	10	.33672E	10	.18252E	10	.97666E	9	.51700E	9
140.2	.88316E	10	.50769E	10	.28656E	10	.15934E	10	.87491E	9
169.6	.12799E	11	.77255E	10	.45676E	10	.26547E	10	.15208E	10
205.1	.18460E	11	.11763E	11	.73262E	10	.44769E	10	.26917E	10
248.1	.26261E	11	.17738E	11	.11693E	11	.75516E	10	.47910E	10
300.0	.36548E	11	.26219E	11	.18349E	11	.12569E	11	.84506E	10

Table 1D

GRAPH OF ENERGY LEVELS VS. WC

NSI / III

DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

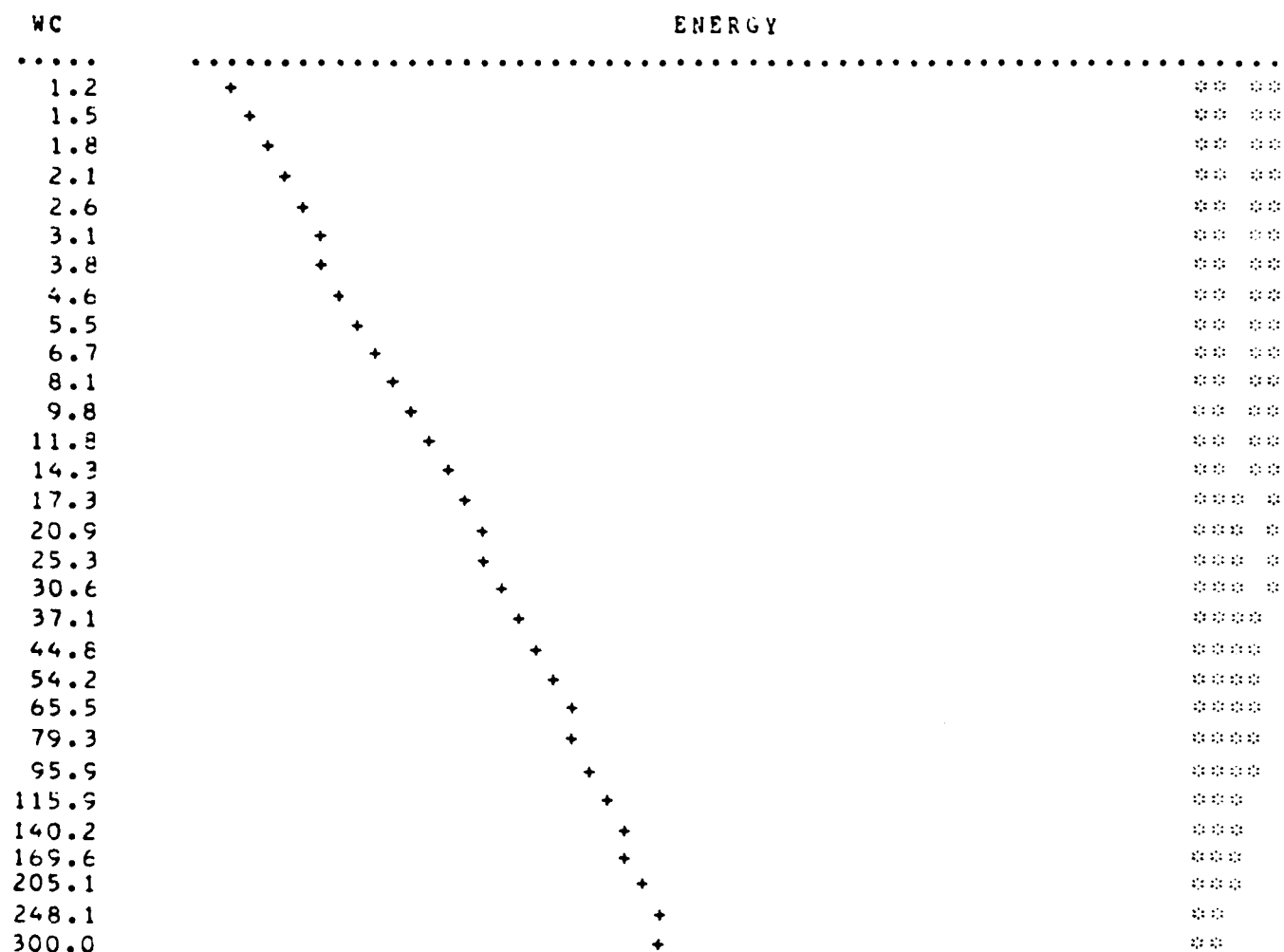


Figure 2

$W_c (\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-287.625	3.326	10.027	16.737	23.450	30.166
1.5	-282.732	3.318	10.013	16.718	23.429	30.141
1.8	-277.842	3.306	9.996	16.697	23.403	30.112
2.1	-272.958	3.296	9.975	16.670	23.371	30.076
2.6	-268.074	3.282	9.950	16.638	23.333	30.033
3.1	-263.202	3.265	9.921	16.599	23.287	29.981
3.8	-258.337	3.245	9.885	16.553	23.232	29.918
4.6	-253.481	3.220	9.841	16.496	23.165	29.842
5.5	-248.637	3.191	9.789	16.428	23.085	29.751
6.7	-243.806	3.155	9.726	16.347	22.988	29.641
8.1	-238.993	3.113	9.651	16.249	22.871	29.508
9.8	-234.200	3.063	9.561	16.131	22.731	29.348
11.8	-229.431	3.003	9.453	15.989	22.562	29.156
14.3	-224.690	2.932	9.324	15.820	22.360	28.925
17.3	-219.984	2.849	9.170	15.617	22.118	28.649
20.9	-215.318	2.752	8.987	15.376	21.828	28.318
25.3	-210.700	2.639	8.772	15.089	21.484	27.923
30.6	-206.137	2.509	8.518	14.750	21.074	27.453
37.1	-201.639	2.361	8.221	14.350	20.590	26.896
44.8	-197.215	2.195	7.877	13.881	20.019	26.237
54.2	-192.876	2.010	7.481	13.335	19.351	25.462
65.5	-188.634	1.810	7.031	12.705	18.574	24.557
79.3	-184.498	1.598	6.525	11.986	17.678	23.508
95.9	-180.478	1.380	5.966	11.175	16.656	22.302
115.5	-176.583	1.162	5.362	10.273	15.505	20.932
140.2	-172.817	.952	4.723	9.290	14.229	19.397
169.6	-169.181	.759	4.066	8.242	12.841	17.704
205.1	-165.669	.589	3.414	7.154	11.365	15.877
248.1	-162.268	.446	2.790	6.060	9.838	13.951
300.0	-158.953	.329	2.218	5.000	8.310	11.980

Table 2A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	36.883	43.601	50.321	57.040	63.761
1.5	36.856	43.572	50.289	57.007	63.725
1.8	36.823	43.536	50.251	56.966	63.682
2.1	36.784	43.493	50.205	56.917	63.630
2.6	36.736	43.442	50.149	56.857	63.567
3.1	36.679	43.379	50.081	56.786	63.491
3.8	36.609	43.303	50.000	56.699	63.400
4.6	36.525	43.212	49.902	56.594	63.289
5.5	36.424	43.102	49.783	56.468	63.155
6.7	36.302	42.969	49.640	56.316	62.994
8.1	36.154	42.808	49.468	56.132	62.800
9.8	35.977	42.615	49.260	55.911	62.566
11.8	35.764	42.383	49.010	55.644	62.283
14.3	35.508	42.104	48.710	55.324	61.944
17.3	35.201	41.769	48.349	54.938	61.536
20.5	34.833	41.367	47.916	54.476	61.046
25.3	34.394	40.887	47.397	53.922	60.459
30.6	33.869	40.313	46.778	53.260	59.756
37.1	33.246	39.630	46.040	52.470	58.917
44.8	32.509	38.820	45.163	51.531	57.919
54.2	31.639	37.863	44.126	50.418	56.735
65.5	30.619	36.739	42.904	49.105	55.336
79.3	29.432	35.425	41.473	47.564	53.692
95.9	28.060	33.902	39.809	45.768	51.771
115.9	26.493	32.153	37.891	43.691	49.545
140.2	24.722	30.166	35.702	41.313	46.987
169.6	22.753	27.940	33.237	38.623	44.082
205.1	20.602	25.489	30.503	35.622	40.829
248.1	18.305	22.844	27.530	32.337	37.246
300.0	15.916	20.058	24.367	28.815	33.379

Table 2B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.49821E	8	.38442E	8	.29652E	8	.22868E	8	.17635E	8
1.5	.60227E	8	.46482E	8	.35859E	8	.27659E	8	.21331E	8
1.8	.72799E	8	.56200E	8	.43364E	8	.33453E	8	.25804E	8
2.1	.87985E	8	.67947E	8	.52440E	8	.40462E	8	.31215E	8
2.6	.10634E	9	.82158E	8	.63426E	8	.48950E	8	.37771E	8
3.1	.12849E	9	.99317E	8	.76699E	8	.59210E	8	.45699E	8
3.8	.15523E	9	.12006E	9	.92754E	8	.71629E	8	.55300E	8
4.6	.18749E	9	.14512E	9	.11217E	9	.86658E	8	.66927E	8
5.5	.22641E	9	.17539E	9	.13566E	9	.10485E	9	.81013E	8
6.7	.27332E	9	.21195E	9	.16405E	9	.12688E	9	.98080E	8
8.1	.32980E	9	.25609E	9	.19839E	9	.15354E	9	.11877E	9
9.8	.39779E	9	.30935E	9	.23991E	9	.18584E	9	.14386E	9
11.8	.47951E	9	.37361E	9	.29012E	9	.22497E	9	.17430E	9
14.3	.57761E	9	.45107E	9	.35081E	9	.27238E	9	.21127E	9
17.3	.69521E	9	.54439E	9	.42419E	9	.32986E	9	.25620E	9
20.9	.83590E	9	.65672E	9	.51289E	9	.39957E	9	.31084E	9
25.3	.10038E	10	.79179E	9	.62009E	9	.48417E	9	.37739E	9
30.6	.12037E	10	.95399E	9	.74960E	9	.58689E	9	.45852E	9
37.1	.14407E	10	.11484E	10	.90602E	9	.71168E	9	.55759E	9
44.8	.17207E	10	.13811E	10	.10948E	10	.86339E	9	.67878E	9
54.2	.20497E	10	.16587E	10	.13226E	10	.10479E	10	.82727E	9
65.5	.24341E	10	.19890E	10	.15969E	10	.12726E	10	.10096E	10
79.3	.28799E	10	.23802E	10	.19269E	10	.15461E	10	.12339E	10
95.9	.33930E	10	.28414E	10	.23229E	10	.18790E	10	.15104E	10
115.9	.39780E	10	.33816E	10	.27965E	10	.22841E	10	.18516E	10
140.2	.46391E	10	.40097E	10	.33604E	10	.27760E	10	.22731E	10
169.6	.53795E	10	.47338E	10	.40279E	10	.33715E	10	.27933E	10
205.1	.62025E	10	.55608E	10	.48120E	10	.40888E	10	.34341E	10
248.1	.71136E	10	.64972E	10	.57256E	10	.49473E	10	.42198E	10
300.0	.81226E	10	.75507E	10	.67809E	10	.59664E	10	.51770E	10

Table 2C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.13598E	8	.10486E	8	.80850E	7	.62338E	7	.48065E	7
1.5	.16451E	8	.12686E	8	.97824E	7	.75433E	7	.58165E	7
1.8	.19902E	8	.15349E	8	.11837E	8	.91287E	7	.70396E	7
2.1	.24080E	8	.18573E	8	.14326E	8	.11049E	8	.85213E	7
2.6	.29142E	8	.22482E	8	.17343E	8	.13378E	8	.10319E	8
3.1	.35266E	8	.27212E	8	.20995E	8	.16195E	8	.12496E	8
3.8	.42686E	8	.32945E	8	.25424E	8	.19619E	8	.15138E	8
4.6	.51677E	8	.39896E	8	.30796E	8	.23770E	8	.18345E	8
5.5	.62577E	8	.48327E	8	.37317E	8	.28812E	8	.22243E	8
6.7	.75795E	8	.58560E	8	.45236E	8	.34938E	8	.26982E	8
8.1	.91833E	8	.70987E	8	.54861E	8	.42391E	8	.32751E	8
9.8	.11131E	9	.86094E	8	.66574E	8	.51469E	8	.39784E	8
11.8	.13498E	9	.10448E	9	.80845E	8	.62542E	8	.48372E	8
14.3	.16376E	9	.12687E	9	.98257E	8	.76071E	8	.58879E	8
17.3	.19882E	9	.15420E	9	.11954E	9	.92637E	8	.71765E	8
20.9	.24158E	9	.18761E	9	.14561E	9	.11297E	9	.87610E	8
25.3	.29380E	9	.22853E	9	.17764E	9	.13800E	9	.10716E	9
30.6	.35772E	9	.27878E	9	.21708E	9	.16892E	9	.13138E	9
37.1	.43611E	9	.34066E	9	.26583E	9	.20728E	9	.16151E	9
44.8	.53252E	9	.41713E	9	.32635E	9	.25508E	9	.19922E	9
54.2	.65142E	9	.51199E	9	.40182E	9	.31499E	9	.24668E	9
65.5	.79852E	9	.63016E	9	.49643E	9	.39053E	9	.30636E	9
79.3	.98116E	9	.77809E	9	.61575E	9	.48646E	9	.38378E	9
95.9	.12087E	10	.96420E	9	.76721E	9	.60922E	9	.48295E	9
115.9	.14932E	10	.11995E	10	.96073E	9	.76759E	9	.61203E	9
140.2	.18498E	10	.14986E	10	.12096E	10	.97357E	9	.78168E	9
169.6	.22978E	10	.18800E	10	.15317E	10	.12436E	10	.10068E	10
205.1	.28605E	10	.23678E	10	.19503E	10	.15999E	10	.13080E	10
248.1	.35658E	10	.29917E	10	.24957E	10	.20722E	10	.17138E	10
300.0	.44460E	10	.37878E	10	.32063E	10	.26996E	10	.22627E	10

Table 2D

GRAPH OF ENERGY LEVELS VS. WC

NSI/III

DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER

TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

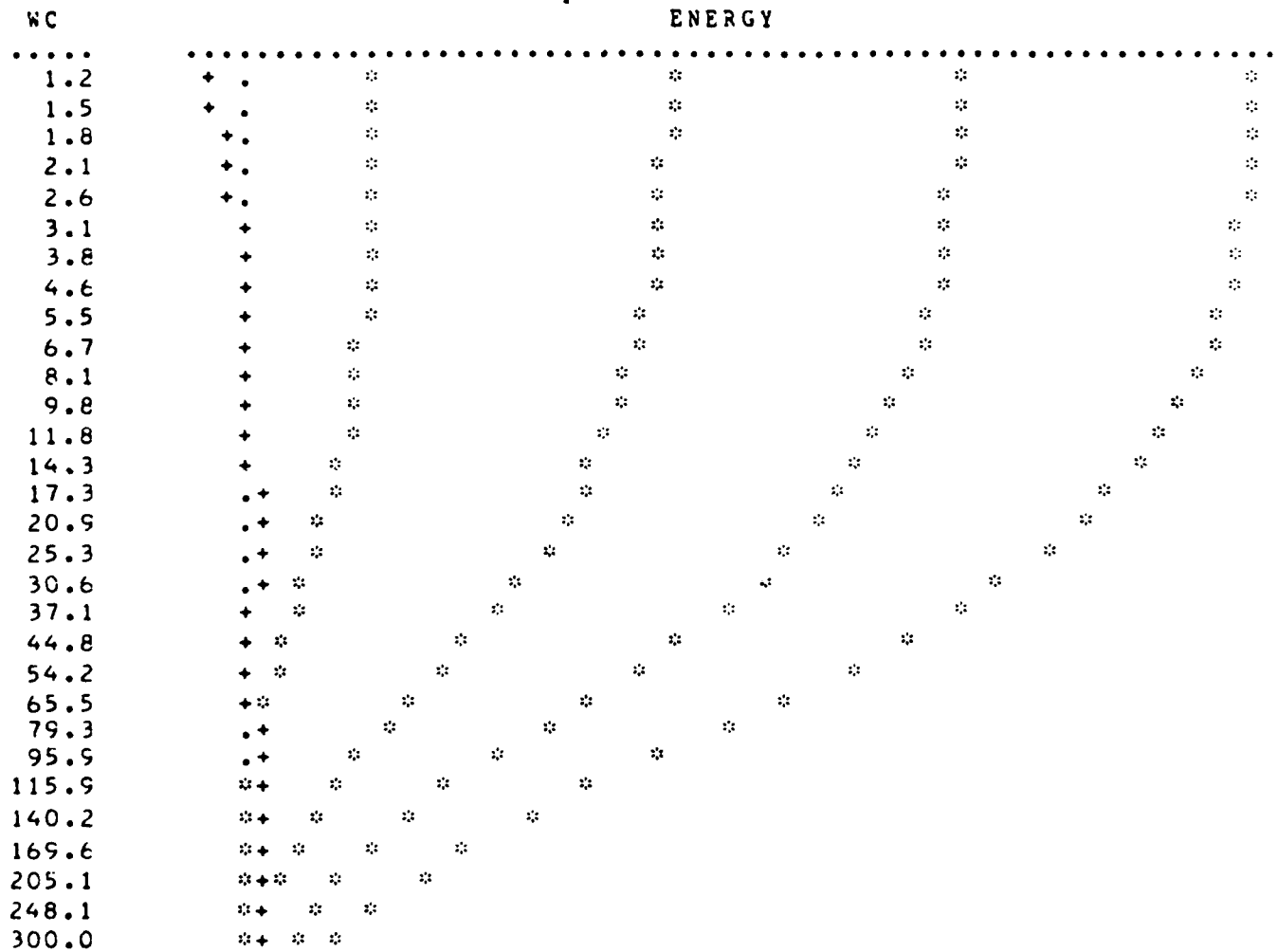


Figure 3

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-7.341	23.069	70.116	117.330	164.614	211.939
1.5	-6.222	22.920	69.854	116.991	164.212	211.482
1.8	-5.131	22.741	69.539	116.582	163.727	210.931
2.1	-4.074	22.527	69.160	116.090	163.142	210.267
2.6	-3.057	22.271	68.705	115.497	162.438	209.466
3.1	-2.087	21.965	68.158	114.784	161.590	208.502
3.8	-1.172	21.600	67.502	113.928	160.571	207.341
4.6	-.321	21.166	66.718	112.901	159.347	205.947
5.5	.455	20.657	65.782	111.672	157.879	204.273
6.7	1.147	20.056	64.668	110.204	156.122	202.266
8.1	1.744	19.353	63.346	108.454	154.024	199.867
9.8	2.236	18.538	61.785	106.376	151.525	197.004
11.8	2.616	17.600	59.949	103.917	148.558	193.596
14.3	2.879	16.534	57.806	101.021	145.049	189.556
17.3	3.025	15.338	55.320	97.621	140.920	184.786
20.9	3.064	14.017	52.466	93.690	136.089	179.183
25.3	3.015	12.589	49.223	89.148	130.479	172.643
30.6	2.906	11.080	45.592	83.968	124.019	165.068
37.1	2.782	9.533	41.592	78.137	116.662	156.377
44.8	2.692	7.997	37.275	71.674	108.393	146.520
54.2	2.684	6.530	32.730	64.647	99.248	135.497
65.5	2.791	5.186	28.082	57.182	89.329	123.382
79.3	3.010	4.009	23.489	49.467	78.823	110.341
95.9	3.303	3.021	19.122	41.750	68.004	96.651
115.9	3.607	2.227	15.141	34.309	57.223	82.702
140.2	3.885	1.611	11.669	27.427	46.877	68.973
169.6	4.129	1.148	8.772	21.331	37.353	55.977
205.1	4.343	.808	6.450	16.168	28.963	44.189
248.1	4.527	.564	4.657	11.974	21.890	33.958
300.0	4.684	.392	3.313	8.696	16.172	25.459

Table 3A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	259.291	306.664	354.053	401.454	448.866
1.5	258.786	306.114	353.462	400.824	448.200
1.8	258.176	305.450	352.748	400.064	447.396
2.1	257.440	304.650	351.887	399.147	446.425
2.6	256.553	303.684	350.848	398.040	445.255
3.1	255.485	302.520	349.597	396.706	443.843
3.8	254.198	301.119	348.089	395.098	442.141
4.6	252.651	299.432	346.273	393.163	440.092
5.5	250.793	297.406	344.091	390.835	437.626
6.7	248.563	294.973	341.470	388.038	434.663
8.1	245.894	292.058	338.327	384.682	431.107
9.8	242.705	288.572	334.566	380.663	426.845
11.8	238.905	284.412	330.073	375.859	421.747
14.3	234.389	279.462	324.722	370.131	415.665
17.3	229.045	273.594	318.368	363.324	408.429
20.9	222.750	266.667	310.855	355.262	399.850
25.3	215.377	258.531	302.013	345.758	389.722
30.6	206.800	249.037	291.668	334.616	377.828
37.1	196.908	238.044	279.652	321.642	363.948
44.8	185.617	225.436	265.819	306.658	347.876
54.2	172.892	211.142	250.062	289.527	329.444
65.5	158.772	195.166	232.352	270.181	308.548
79.3	143.396	177.618	212.762	248.662	285.194
95.9	127.032	158.742	191.515	225.160	259.542
115.9	110.084	138.946	169.006	200.058	231.951
140.2	93.084	118.797	145.822	173.949	203.016
169.6	76.649	98.988	122.718	147.631	173.567
205.1	61.398	80.264	100.543	122.045	144.618
248.1	47.848	63.304	80.126	98.154	117.256
300.0	36.331	48.606	62.135	76.793	92.474

Table 3B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.10070E 11	.84106E 7	.69159E 4	.10751E 3	.10751E 3
1.5	.12178E 11	.10357E 8	.85911E 4	.10751E 3	.10751E 3
1.8	.14728E 11	.12802E 8	.10756E 5	.12002E 3	.10751E 3
2.1	.17812E 11	.15896E 8	.13557E 5	.12002E 3	.10751E 3
2.6	.21541E 11	.19848E 8	.17250E 5	.12002E 3	.10751E 3
3.1	.26051E 11	.24948E 8	.22195E 5	.12002E 3	.10751E 3
3.8	.31505E 11	.31612E 8	.28949E 5	.13502E 3	.10751E 3
4.6	.38100E 11	.40446E 8	.38385E 5	.13502E 3	.10751E 3
5.5	.46075E 11	.52360E 8	.51907E 5	.14752E 3	.10751E 3
6.7	.55717E 11	.68747E 8	.71847E 5	.18002E 3	.10751E 3
8.1	.67376E 11	.91808E 8	.10231E 6	.20753E 3	.10751E 3
9.8	.81470E 11	.12512E 9	.15069E 6	.28004E 3	.10751E 3
11.8	.98507E 11	.17473E 9	.23113E 6	.38005E 3	.10751E 3
14.3	.11909E 12	.25113E 9	.37200E 6	.60008E 3	.10751E 3
17.3	.14396E 12	.37342E 9	.63392E 6	.10301E 4	.10751E 3
20.9	.17398E 12	.57759E 9	.11550E 7	.20403E 4	.10751E 3
25.3	.21018E 12	.93447E 9	.22735E 7	.45781E 4	.12002E 3
30.6	.25373E 12	.15891E 10	.48840E 7	.11764E 5	.13502E 3
37.1	.30593E 12	.28487E 10	.11547E 8	.34782E 5	.19503E 3
44.8	.36804E 12	.53805E 10	.30181E 8	.11909E 6	.48256E 3
54.2	.44093E 12	.10635E 11	.86949E 8	.47191E 6	.20978E 4
65.5	.52430E 12	.21656E 11	.27225E 9	.21389E 7	.12719E 5
79.3	.61547E 12	.44232E 11	.90018E 9	.10776E 8	.93172E 5
95.9	.70853E 12	.87349E 11	.30083E 10	.57542E 8	.76619E 6
115.9	.79580E 12	.16050E 12	.96369E 10	.30601E 9	.65691E 7
140.2	.87174E 12	.26716E 12	.28101E 11	.15172E 10	.54278E 8
169.6	.93497E 12	.39981E 12	.71488E 11	.65992E 10	.39944E 9
205.1	.98627E 12	.54225E 12	.15413E 12	.23936E 11	.24370E 10
248.1	.10271E 13	.67764E 12	.27933E 12	.69838E 11	.11661E 11
300.0	.10591E 13	.79502E 12	.43210E 12	.16153E 12	.42340E 11

Table 3C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
1.5	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
1.8	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
2.1	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
2.6	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
3.1	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
3.8	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
4.6	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
5.5	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
6.7	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
8.1	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
9.8	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
11.8	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
14.3	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
17.3	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
20.9	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
25.3	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
30.6	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
37.1	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
44.8	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
54.2	.10751E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
65.5	.16502E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
79.3	.74010E	3	.10751E	3	.10751E	3	.10751E	3	.10751E	3
95.9	.79585E	4	.18002E	3	.10751E	3	.10751E	3	.10751E	3
115.9	.10596E	6	.14777E	4	.12002E	3	.10751E	3	.10751E	3
140.2	.14321E	7	.29784E	5	.61008E	3	.12002E	3	.10751E	3
169.6	.17702E	8	.61019E	6	.17160E	5	.51007E	3	.12002E	3
205.1	.18222E	9	.10601E	8	.49852E	6	.19598E	5	.75510E	3
248.1	.14440E	10	.14056E	9	.11129E	8	.73472E	6	.41343E	5
300.0	.83635E	10	.13189E	10	.17166E	9	.18835E	8	.17712E	7

Table 3D

GRAPH OF ENERGY LEVELS VS. WC

NSI / III

DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER
TEMPERATURE = 300.0 DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

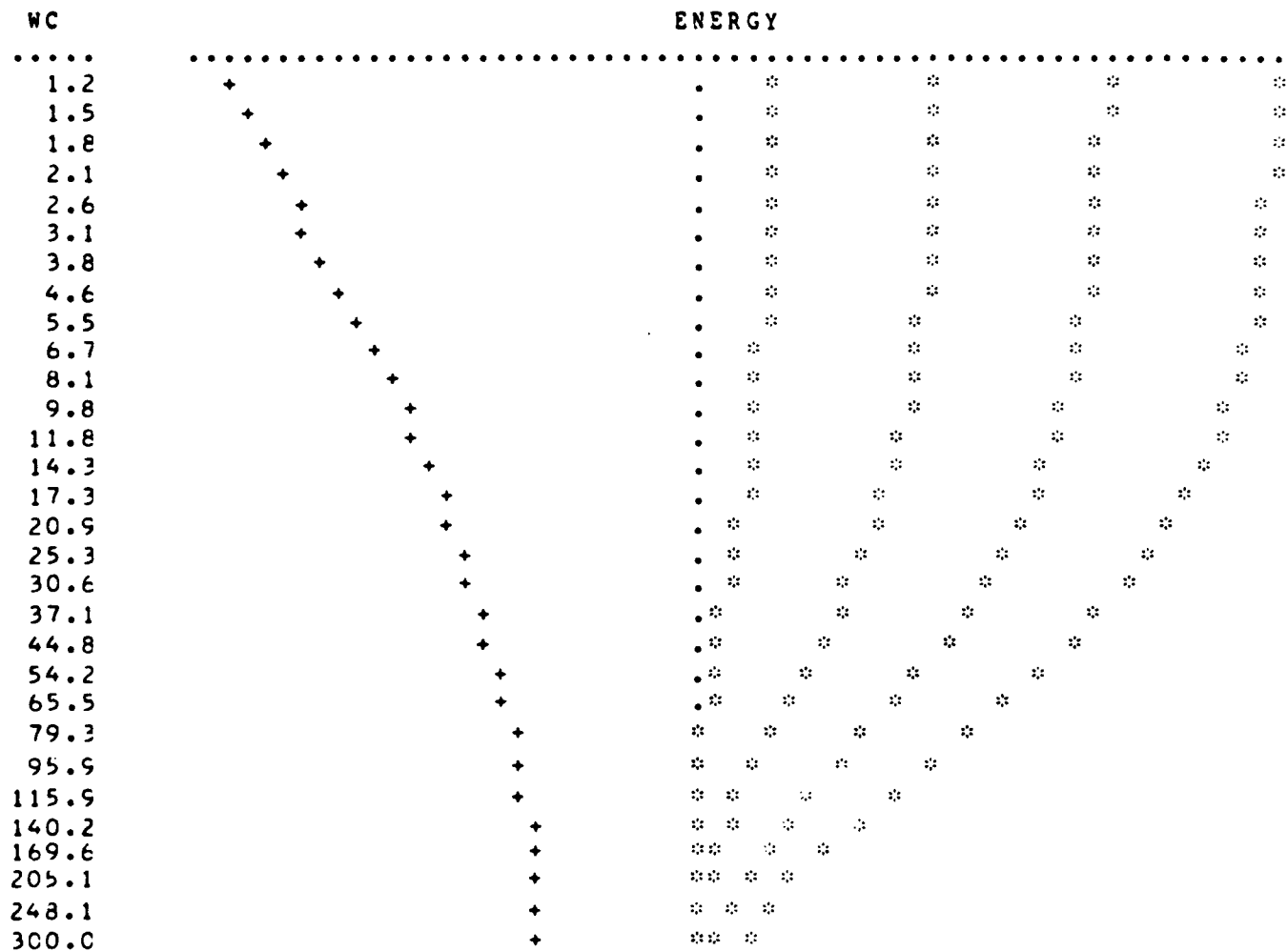


Figure 4

w_c (Å)	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-135.201	23.069	70.116	117.330	164.614	211.939
1.5	-130.452	22.920	69.854	116.991	164.212	211.482
1.8	-125.736	22.741	69.539	116.582	163.727	210.931
2.1	-121.060	22.527	69.160	116.090	163.142	210.267
2.6	-116.432	22.271	68.705	115.497	162.438	209.466
3.1	-111.859	21.965	68.158	114.784	161.590	208.502
3.8	-107.352	21.600	67.502	113.928	160.571	207.341
4.6	-102.924	21.168	66.718	112.901	159.347	205.947
5.5	-98.586	20.657	65.782	111.672	157.879	204.273
6.7	-94.354	20.056	64.668	110.204	156.122	202.266
8.1	-90.243	19.353	63.346	108.454	154.024	199.867
9.8	-86.270	18.538	61.785	106.376	151.525	197.004
11.8	-82.452	17.600	59.949	103.917	148.558	193.596
14.3	-78.805	16.534	57.806	101.021	145.049	189.556
17.3	-75.342	15.338	55.320	97.631	140.920	184.786
20.9	-72.076	14.017	52.466	93.690	136.089	179.183
25.3	-69.011	12.589	49.223	89.148	130.479	172.643
30.6	-66.150	11.060	45.592	83.968	124.019	165.068
37.1	-63.489	9.533	41.592	78.137	116.662	156.377
44.8	-61.021	7.997	37.275	71.674	108.393	146.520
54.2	-58.739	6.530	32.730	64.647	99.248	135.497
65.5	-56.639	5.186	28.082	57.182	89.329	123.382
79.3	-54.723	4.009	23.489	49.467	78.823	110.341
95.9	-52.991	3.021	19.122	41.750	68.004	96.651
115.9	-51.445	2.227	15.141	34.309	57.223	82.702
140.2	-50.080	1.611	11.669	27.427	46.877	68.973
169.6	-48.885	1.148	8.772	21.331	37.353	55.977
205.1	-47.838	.808	6.450	16.168	28.963	44.189
248.1	-46.904	.564	4.657	11.974	21.890	33.958
300.0	-46.013	.392	3.313	8.696	16.172	25.459

Table 4A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	259.291	306.664	354.053	401.454	448.866
1.5	258.786	306.114	353.462	400.824	448.200
1.8	258.176	305.450	352.748	400.064	447.396
2.1	257.440	304.650	351.887	399.147	446.425
2.6	256.553	303.684	350.848	398.040	445.255
3.1	255.485	302.520	349.597	396.706	443.843
3.8	254.198	301.119	348.089	395.098	442.141
4.6	252.651	299.432	346.273	393.163	440.092
5.5	250.793	297.406	344.091	390.835	437.626
6.7	248.563	294.973	341.470	388.038	434.663
8.1	245.894	292.058	338.327	384.682	431.107
9.8	242.705	288.572	334.566	380.663	426.845
11.8	238.905	284.412	330.073	375.859	421.747
14.3	234.389	279.462	324.722	370.131	415.665
17.3	229.045	273.594	318.368	363.324	408.429
20.9	222.750	266.667	310.855	355.262	399.850
25.3	215.377	258.531	302.013	345.758	389.722
30.6	206.800	249.037	291.668	334.616	377.828
37.1	196.908	238.044	279.652	321.642	363.948
44.8	185.617	225.436	265.819	306.658	347.876
54.2	172.892	211.142	250.062	289.527	329.444
65.5	158.772	195.166	232.352	270.181	308.548
79.3	143.396	177.618	212.762	248.662	285.194
95.9	127.032	158.742	191.515	225.160	259.542
115.9	110.084	138.946	169.006	200.058	231.951
140.2	93.084	118.797	145.822	173.949	203.016
169.6	76.649	98.988	122.718	147.631	173.567
205.1	61.398	80.264	100.543	122.045	144.618
248.1	47.848	63.304	80.126	98.154	117.256
300.0	36.331	48.606	62.135	76.793	92.474

Table 4B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.84468E	10	.13692E	10	.22032E	9	.35355E	8	.56647E	7
1.5	.10207E	11	.16620E	10	.26827E	9	.43154E	8	.69287E	7
1.8	.12332E	11	.20191E	10	.32710E	9	.52774E	8	.84949E	7
2.1	.14896E	11	.24552E	10	.39952E	9	.64688E	8	.10445E	8
2.6	.17989E	11	.29888E	10	.48897E	9	.79515E	8	.12887E	8
3.1	.21716E	11	.36434E	10	.59993E	9	.98071E	8	.15966E	8
3.8	.26205E	11	.44484E	10	.73827E	9	.12145E	9	.19880E	8
4.6	.31606E	11	.54419E	10	.91177E	9	.15115E	9	.24905E	8
5.5	.38096E	11	.66728E	10	.11309E	10	.18921E	9	.31428E	8
6.7	.45885E	11	.82048E	10	.14100E	10	.23856E	9	.40008E	8
8.1	.55212E	11	.10122E	11	.17688E	10	.30334E	9	.51470E	8
9.8	.66355E	11	.12535E	11	.22353E	10	.38967E	9	.67056E	8
11.8	.79624E	11	.15594E	11	.28497E	10	.50666E	9	.88687E	8
14.3	.95361E	11	.19501E	11	.36703E	10	.66830E	9	.11941E	9
17.3	.11392E	12	.24532E	11	.47841E	10	.89647E	9	.16421E	9
20.9	.13567E	12	.31063E	11	.63217E	10	.12263E	10	.23144E	9
25.3	.16090E	12	.39604E	11	.84829E	10	.17154E	10	.33562E	9
30.6	.18982E	12	.50842E	11	.11574E	11	.24601E	10	.50260E	9
37.1	.22245E	12	.65665E	11	.16069E	11	.36244E	10	.77980E	9
44.8	.25851E	12	.85164E	11	.22683E	11	.54901E	10	.12563E	10
54.2	.29734E	12	.11055E	12	.32477E	11	.85397E	10	.21020E	10
65.5	.33792E	12	.14293E	12	.46935E	11	.13587E	11	.36427E	10
79.3	.37885E	12	.18291E	12	.67947E	11	.21950E	11	.64958E	10
95.9	.41869E	12	.23017E	12	.97567E	11	.35611E	11	.11789E	11
115.9	.45612E	12	.28309E	12	.13742E	12	.57217E	11	.21446E	11
140.2	.49025E	12	.33887E	12	.18785E	12	.89639E	11	.38376E	11
169.6	.52064E	12	.39415E	12	.24715E	12	.13492E	12	.66218E	11
205.1	.54738E	12	.44597E	12	.31165E	12	.19292E	12	.10822E	12
248.1	.57112E	12	.49257E	12	.37682E	12	.26068E	12	.16546E	12
300.0	.59335E	12	.53411E	12	.43916E	12	.33344E	12	.23578E	12

Table 4C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.90691E	6	.14540E	6	.23575E	5	.41304E	4	.10326E	4
1.5	.11113E	7	.17841E	6	.28923E	5	.49682E	4	.11495E	4
1.8	.13656E	7	.21955E	6	.35557E	5	.60398E	4	.13248E	4
2.1	.16836E	7	.27126E	6	.43983E	5	.73938E	4	.15392E	4
2.6	.20840E	7	.33676E	6	.54611E	5	.91278E	4	.18217E	4
3.1	.25923E	7	.42035E	6	.68327E	5	.11378E	5	.22113E	4
3.8	.32436E	7	.52824E	6	.86144E	5	.14291E	5	.26692E	4
4.6	.40874E	7	.66912E	6	.10958E	6	.18168E	5	.32829E	4
5.5	.51947E	7	.85586E	6	.14090E	6	.23399E	5	.41889E	4
6.7	.66701E	7	.11075E	7	.18357E	6	.30598E	5	.53676E	4
8.1	.86709E	7	.14534E	7	.24289E	6	.40720E	5	.71113E	4
9.8	.11440E	8	.19395E	7	.32749E	6	.55390E	5	.96344E	4
11.8	.15362E	8	.26409E	7	.45156E	6	.77153E	5	.13395E	5
14.3	.21068E	8	.36830E	7	.63948E	6	.11066E	6	.19366E	5
17.3	.29622E	8	.52843E	7	.93478E	6	.16452E	6	.29098E	5
20.9	.42885E	8	.78395E	7	.14184E	7	.25474E	6	.45737E	5
25.3	.64226E	8	.12092E	8	.22483E	7	.41405E	6	.75906E	5
30.6	.99982E	8	.19504E	8	.37475E	7	.71155E	6	.13399E	6
37.1	.16251E	9	.33081E	8	.66126E	7	.13027E	7	.25379E	6
44.8	.27676E	9	.59286E	8	.12426E	8	.25589E	7	.51957E	6
54.2	.49464E	9	.11259E	9	.24972E	8	.54233E	7	.11576E	7
65.5	.92649E	9	.22660E	9	.53747E	8	.12435E	8	.28179E	7
79.3	.18088E	10	.46124E	9	.12353E	9	.30794E	8	.74914E	7
95.9	.36424E	10	.10682E	10	.30056E	9	.81755E	8	.21614E	8
115.9	.74470E	10	.24390E	10	.76236E	9	.22927E	9	.66739E	8
140.2	.15142E	11	.56053E	10	.19708E	10	.66379E	9	.21556E	9
169.6	.29696E	11	.12623E	11	.50446E	10	.19245E	10	.70555E	9
205.1	.55982E	11	.27078E	11	.12378E	11	.53914E	10	.22518E	10
248.1	.97526E	11	.53931E	11	.28222E	11	.14074E	11	.67267E	10
300.0	.15642E	12	.98020E	11	.58370E	11	.33211E	11	.18138E	11

Table 4D

GRAPH OF ENERGY LEVELS VS. WC

NSI / III

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

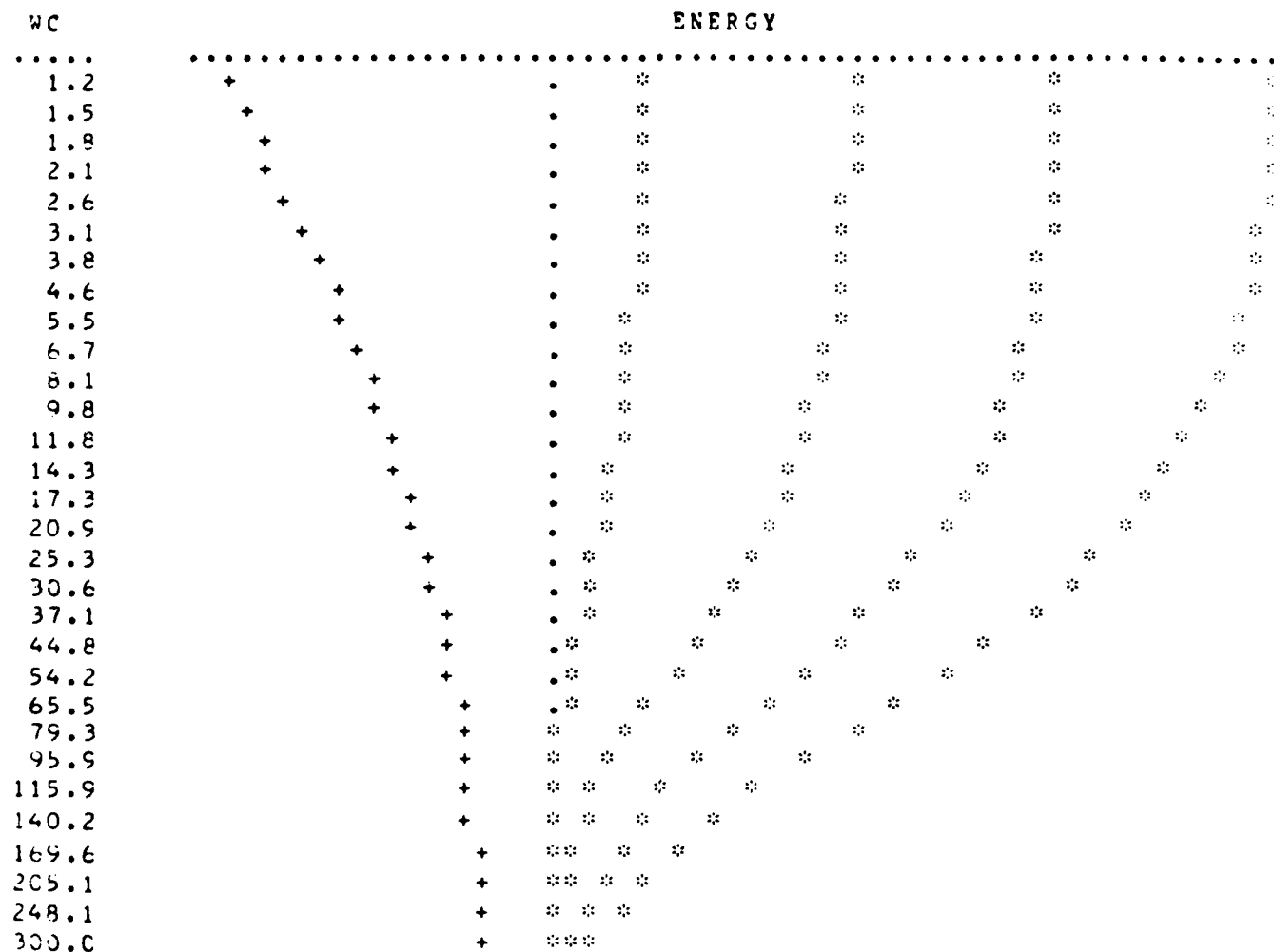


Figure 5

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-105.388	32.434	98.824	165.497	232.286	299.143
1.5	-100.726	32.185	98.386	164.928	231.611	298.377
1.8	-96.115	31.887	97.859	164.243	230.798	297.453
2.1	-91.564	31.530	97.225	163.418	229.818	296.339
2.6	-87.084	31.104	96.464	162.427	228.639	294.997
3.1	-82.687	30.597	95.552	161.235	227.220	293.383
3.8	-78.387	29.994	94.460	159.806	225.517	291.442
4.6	-74.202	29.282	93.157	158.095	223.474	289.113
5.5	-70.147	28.444	91.605	156.051	221.029	286.320
6.7	-66.242	27.464	89.763	153.614	218.108	282.980
8.1	-62.504	26.325	87.587	150.719	214.627	278.993
9.8	-58.953	25.015	85.028	147.292	210.494	274.248
11.8	-55.603	23.524	82.037	143.255	205.604	268.619
14.3	-52.467	21.848	78.567	138.526	199.847	261.970
17.3	-49.549	19.995	74.577	133.025	193.107	254.156
20.9	-46.847	17.987	70.041	126.680	185.275	245.031
25.3	-44.349	15.862	64.953	119.435	176.249	234.453
30.6	-42.036	13.675	59.340	111.269	165.959	222.305
37.1	-39.885	11.499	53.270	102.205	154.378	208.512
44.8	-37.877	9.412	46.865	92.333	141.550	193.068
54.2	-36.001	7.494	40.297	81.821	127.611	176.064
65.5	-34.262	5.806	33.785	70.930	112.813	157.723
79.3	-32.669	4.385	27.571	60.000	97.532	138.424
95.9	-31.234	3.238	21.885	49.427	82.259	118.704
115.9	-29.963	2.346	16.906	39.608	67.551	99.231
140.2	-28.851	1.673	12.734	30.879	53.959	80.732
169.6	-27.888	1.180	9.381	23.456	41.938	63.886
205.1	-27.055	.824	6.783	17.405	31.765	49.209
248.1	-26.323	.572	4.832	12.660	23.512	36.969
300.C	-25.629	.395	3.402	9.061	17.067	27.172

Table 5A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	366.047	432.986	499.951	566.937	633.941
1.5	365.199	432.063	498.958	565.880	632.823
1.8	364.176	430.949	497.761	564.604	631.473
2.1	362.942	429.605	496.316	563.065	629.844
2.6	361.455	427.986	494.575	561.209	627.880
3.1	359.665	426.037	492.477	558.972	625.513
3.8	357.513	423.691	489.952	556.279	622.663
4.6	354.927	420.871	486.915	553.040	619.233
5.5	351.825	417.486	483.268	549.148	615.110
6.7	348.109	413.428	478.894	544.478	610.160
8.1	343.669	408.575	473.658	538.884	604.228
9.8	338.377	402.782	467.403	532.196	597.132
11.8	332.087	395.889	459.950	524.220	588.663
14.3	324.640	387.713	451.099	514.738	578.585
17.3	315.864	378.057	440.629	503.504	566.632
20.9	305.579	366.712	428.300	490.255	552.515
25.3	293.607	353.464	413.869	474.715	535.928
30.6	279.788	338.113	397.094	456.607	516.560
37.1	263.998	320.489	377.765	435.677	494.116
44.8	246.182	300.487	355.727	411.724	468.352
54.2	226.382	278.101	330.924	384.643	439.112
65.5	204.782	253.470	303.446	354.475	406.387
79.3	181.743	226.922	273.586	321.470	370.381
95.9	157.820	199.013	241.882	286.141	331.576
115.9	133.751	170.524	209.140	249.301	290.781
140.2	110.402	142.425	176.408	212.057	249.143
169.6	88.652	115.768	144.883	175.725	208.079
205.1	69.253	91.528	115.746	141.674	169.124
248.1	52.700	70.440	89.970	111.109	133.705
300.0	39.168	52.878	68.153	84.862	102.894

Table 5B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.18611E	11	.14289E	10	.10830E	9	.81707E	7	.61514E	6
1.5	.22494E	11	.17406E	10	.13260E	9	.10045E	8	.75877E	6
1.8	.27183E	11	.21234E	10	.16275E	9	.12390E	8	.93996E	6
2.1	.32844E	11	.25950E	10	.20039E	9	.15347E	8	.11702E	7
2.6	.39676E	11	.31782E	10	.24765E	9	.19105E	8	.14658E	7
3.1	.47916E	11	.39028E	10	.30743E	9	.23926E	8	.18496E	7
3.8	.57849E	11	.48075E	10	.38371E	9	.30181E	8	.23546E	7
4.6	.69813E	11	.59443E	10	.48205E	9	.38407E	8	.30296E	7
5.5	.84207E	11	.73831E	10	.61037E	9	.49391E	8	.39486E	7
6.7	.10150E	12	.92196E	10	.78012E	9	.64323E	8	.52264E	7
8.1	.12225E	12	.11587E	11	.10083E	10	.85047E	8	.70470E	7
9.8	.14707E	12	.14671E	11	.13209E	10	.11450E	9	.97145E	7
11.8	.17669E	12	.18741E	11	.17578E	10	.15750E	9	.13750E	8
14.3	.21188E	12	.24183E	11	.23829E	10	.22219E	9	.20079E	8
17.3	.25346E	12	.31564E	11	.33002E	10	.32285E	9	.30414E	8
20.9	.30219E	12	.41712E	11	.46829E	10	.48534E	9	.48067E	8
25.3	.35872E	12	.55840E	11	.68252E	10	.75803E	9	.79725E	8
30.6	.42333E	12	.75689E	11	.10234E	11	.12344E	10	.13951E	9
37.1	.49575E	12	.10366E	12	.15783E	11	.20998E	10	.25855E	9
44.8	.57481E	12	.14282E	12	.24965E	11	.37274E	10	.50795E	9
54.2	.65835E	12	.19662E	12	.40238E	11	.68706E	10	.10545E	10
65.5	.74325E	12	.26807E	12	.65386E	11	.13019E	11	.22932E	10
79.3	.82600E	12	.35834E	12	.10560E	12	.24973E	11	.51449E	10
95.9	.90335E	12	.46541E	12	.16673E	12	.47531E	11	.11655E	11
115.9	.97306E	12	.58355E	12	.25320E	12	.87751E	11	.25962E	11
140.2	.10341E	13	.70450E	12	.36514E	12	.15368E	12	.55241E	11
169.6	.10863E	13	.81985E	12	.49647E	12	.25080E	12	.10927E	12
205.1	.11306E	13	.92332E	12	.63611E	12	.37762E	12	.19687E	12
248.1	.11685E	13	.10121E	13	.77213E	12	.52436E	12	.32002E	12
300.0	.12029E	13	.10677E	13	.89661E	12	.67732E	12	.47083E	12

Table 5C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.46574E	5	.38966E	4	.70139E	3	.41889E	3	.41889E	3
1.5	.57534E	5	.46954E	4	.75984E	3	.41889E	3	.41889E	3
1.8	.71483E	5	.57573E	4	.80855E	3	.46759E	3	.41889E	3
2.1	.89281E	5	.71600E	4	.93519E	3	.46759E	3	.41889E	3
2.6	.11240E	6	.89622E	4	.10911E	4	.46759E	3	.41889E	3
3.1	.14270E	6	.11329E	5	.12567E	4	.46759E	3	.41889E	3
3.8	.18300E	6	.14525E	5	.14807E	4	.46759E	3	.41889E	3
4.6	.23771E	6	.18918E	5	.18801E	4	.52604E	3	.41889E	3
5.5	.31342E	6	.25094E	5	.23380E	4	.57475E	3	.41889E	3
6.7	.42080E	6	.33969E	5	.30588E	4	.64294E	3	.41889E	3
8.1	.57724E	6	.47237E	5	.41889E	4	.70139E	3	.41889E	3
9.8	.81269E	6	.67597E	5	.59229E	4	.86700E	3	.46759E	3
11.8	.11799E	7	.10031E	6	.87966E	4	.10911E	4	.46759E	3
14.3	.17768E	7	.15513E	6	.13745E	5	.15392E	4	.52604E	3
17.3	.27934E	7	.25209E	6	.22795E	5	.23769E	4	.57475E	3
20.9	.46170E	7	.43391E	6	.40388E	5	.40720E	4	.75984E	3
25.3	.80819E	7	.79762E	6	.77426E	5	.77250E	4	.10911E	4
30.6	.15087E	8	.15796E	7	.16159E	6	.16501E	5	.19873E	4
37.1	.30206E	8	.33947E	7	.37044E	6	.39765E	5	.45201E	4
44.8	.65051E	8	.79552E	7	.93867E	6	.10790E	6	.12440E	5
54.2	.15049E	9	.20340E	8	.26347E	7	.32996E	6	.40447E	5
65.5	.37129E	9	.56432E	8	.81598E	7	.11331E	7	.15237E	6
79.3	.96299E	9	.16766E	9	.27557E	8	.43209E	7	.65140E	6
95.9	.25685E	10	.52184E	9	.99343E	8	.17921E	8	.30893E	7
115.9	.68437E	10	.16505E	10	.37045E	9	.78311E	8	.15730E	8
140.2	.17610E	11	.51086E	10	.13722E	10	.34546E	9	.82254E	8
169.6	.42275E	11	.14857E	11	.48218E	10	.14625E	10	.41824E	9
205.1	.91893E	11	.39076E	11	.15355E	11	.56374E	10	.19497E	10
248.1	.17738E	12	.90307E	11	.42678E	11	.18892E	11	.78917E	10
300.0	.30261E	12	.18088E	12	.10121E	12	.53346E	11	.26643E	11

Table 5D

1.00E+19 300.0 -15.0E-21 * . + 4.9398855

NSI/III - Surface Channel

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE =300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

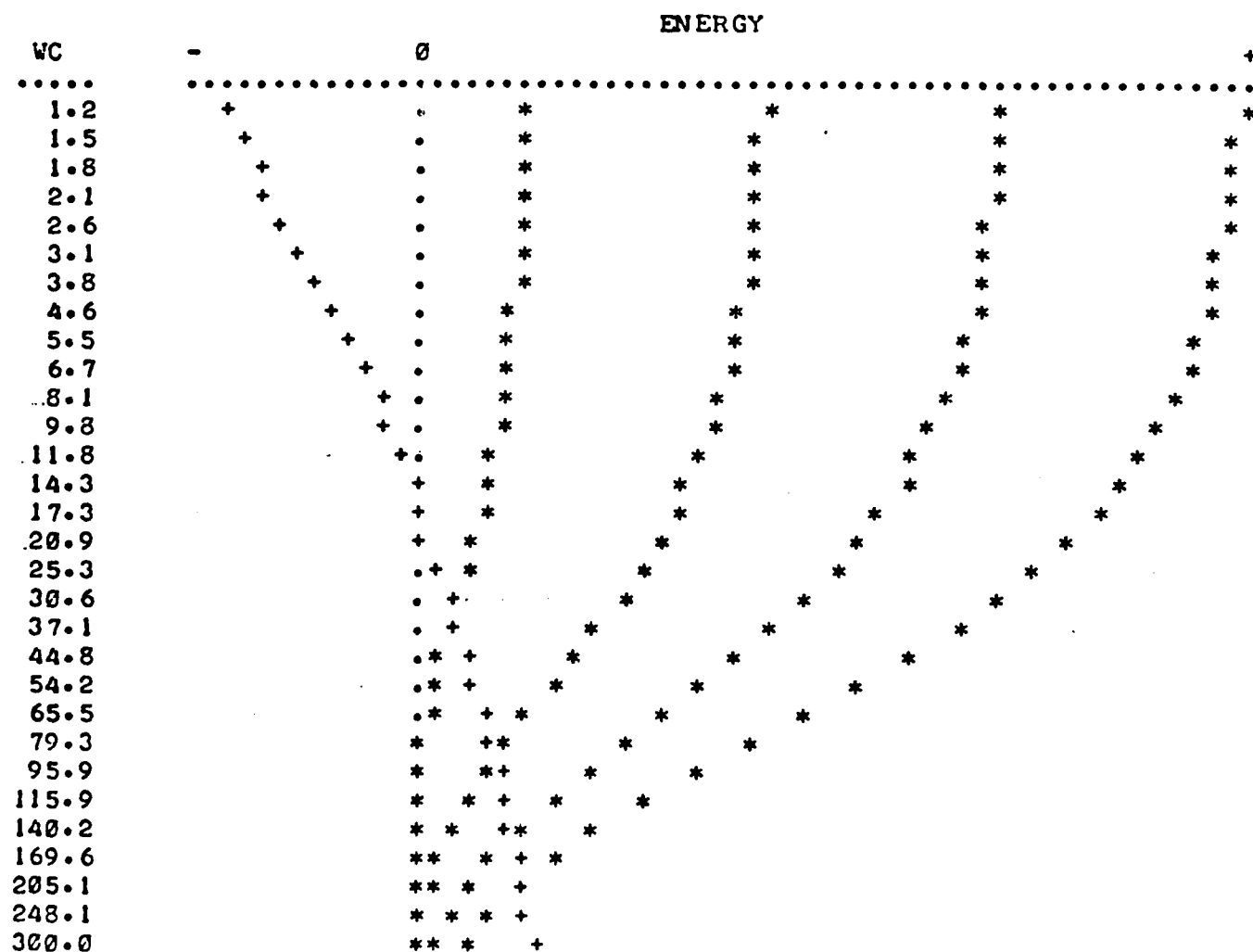


Figure 6

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-58.794	32.474	98.824	165.497	232.286	299.143
1.5	-54.073	32.155	98.386	164.928	231.611	298.377
1.8	-49.389	31.837	97.859	164.243	230.798	297.453
2.1	-44.750	31.512	97.225	163.418	229.818	296.339
2.6	-40.164	31.134	96.464	162.427	228.639	294.997
3.1	-35.639	30.757	95.552	161.235	227.220	293.383
3.8	-31.186	29.374	94.460	159.806	225.517	291.442
4.6	-26.816	29.032	93.157	158.095	223.474	289.113
5.5	-22.540	28.444	91.605	156.051	221.029	286.320
6.7	-18.371	27.164	89.763	153.614	218.108	282.980
8.1	-14.318	26.025	87.587	150.719	214.627	278.993
9.3	-12.392	25.115	85.028	147.292	210.494	274.248
11.8	-6.601	23.024	82.037	143.255	205.604	268.619
14.3	-2.948	21.018	78.567	138.526	199.847	261.970
17.3	.568	19.025	74.577	133.025	193.107	254.156
20.9	3.949	17.037	70.041	126.680	185.275	245.031
25.3	7.203	15.062	64.953	119.435	176.249	234.453
30.6	10.334	13.075	59.340	111.269	165.959	222.305
37.1	13.340	11.079	53.270	102.205	154.378	208.512
44.8	16.210	9.012	46.865	92.333	141.550	193.068
54.2	18.926	7.034	40.297	81.821	127.611	176.064
65.5	21.467	5.076	33.785	70.930	112.813	157.723
79.3	23.812	4.035	27.571	60.000	97.532	138.424
95.9	25.949	3.038	21.885	49.427	82.259	118.704
115.9	27.873	2.046	16.906	39.608	67.551	99.231
140.2	29.573	1.073	12.734	30.879	53.959	80.732
169.6	31.085	1.030	9.381	23.456	41.938	63.886
205.1	32.413	.024	6.783	17.405	31.765	49.209
246.1	33.616	.072	4.832	12.660	23.512	36.969
293.0	34.837	.095	3.402	9.061	17.067	27.172

Table 6A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	366.047	432.986	499.951	566.937	633.941
1.5	365.199	432.063	498.958	565.880	632.823
1.8	364.176	430.949	497.761	564.604	631.473
2.1	362.942	429.605	496.316	563.065	629.844
2.6	361.455	427.986	494.575	561.209	627.880
3.1	359.665	426.037	492.477	558.972	625.513
3.8	357.513	423.691	489.952	556.279	622.663
4.6	354.927	420.871	486.915	553.040	619.233
5.5	351.825	417.486	483.268	549.148	615.110
6.7	348.109	413.428	478.894	544.478	610.160
8.1	343.669	408.575	473.658	538.884	604.228
9.8	338.377	402.782	467.403	532.196	597.132
11.8	332.087	395.889	459.950	524.220	588.663
14.3	324.640	387.713	451.099	514.738	578.585
17.3	315.864	378.057	440.629	503.504	566.632
20.9	305.579	366.712	428.300	490.255	552.515
25.3	293.607	353.464	413.869	474.715	535.928
30.6	279.788	338.113	397.094	456.607	516.560
37.1	263.998	320.489	377.765	435.677	494.116
44.8	246.182	300.487	355.727	411.724	468.352
54.2	226.382	278.101	330.924	384.643	439.112
65.5	204.782	253.470	303.446	354.475	406.387
79.3	181.743	226.922	273.586	321.470	370.381
95.9	157.820	199.013	241.882	286.141	331.576
115.9	133.751	170.524	209.140	249.301	290.781
140.2	110.402	142.425	176.408	212.057	249.143
169.6	88.652	115.768	144.883	175.725	208.079
205.1	69.253	91.528	115.746	141.674	169.124
248.1	52.700	70.440	89.970	111.109	133.705
300.0	39.168	52.878	68.153	84.862	102.894

Table 6B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.11157E 12	.86621E 10	.65709E 9	.49574E 8	.37302E 7
1.5	.13482E 12	.10574E 11	.80635E 9	.61086E 8	.46127E 7
1.8	.16289E 12	.12932E 11	.99252E 9	.75565E 8	.57305E 7
2.1	.19675E 12	.15853E 11	.12261E 10	.93917E 8	.71593E 7
2.6	.23760E 12	.19488E 11	.15215E 10	.11739E 9	.90050E 7
3.1	.28682E 12	.24037E 11	.18980E 10	.14774E 9	.11419E 8
3.8	.34608E 12	.29767E 11	.23830E 10	.18748E 9	.14625E 8
4.6	.41737E 12	.37040E 11	.30149E 10	.24028E 9	.18953E 8
5.5	.50298E 12	.46354E 11	.38499E 10	.31165E 9	.24914E 8
6.7	.60561E 12	.58402E 11	.49707E 10	.41005E 9	.33316E 8
8.1	.72834E 12	.74169E 11	.65026E 10	.54881E 9	.45474E 8
9.8	.87462E 12	.95065E 11	.86403E 10	.74963E 9	.63604E 8
11.8	.10482E 13	.12315E 12	.11693E 11	.10489E 10	.91578E 8
14.3	.12529E 13	.16142E 12	.16163E 11	.15095E 10	.13643E 9
17.3	.14924E 13	.21433E 12	.22891E 11	.22445E 10	.21149E 9
20.9	.17692E 13	.28836E 12	.33308E 11	.34635E 10	.34314E 9
25.3	.20845E 13	.39280E 12	.49893E 11	.55688E 10	.58602E 9
30.6	.24360E 13	.54033E 12	.76977E 11	.93560E 10	.10584E 10
37.1	.28178E 13	.74686E 12	.12208E 12	.16437E 11	.20272E 10
44.8	.32191E 13	.10295E 13	.19793E 12	.30121E 11	.41169E 10
54.2	.36259E 13	.14016E 13	.32478E 12	.57179E 11	.88248E 10
65.5	.40229E 13	.18657E 13	.53148E 12	.11107E 12	.19770E 11
79.3	.43965E 13	.24070E 13	.85128E 12	.21668E 12	.45529E 11
95.9	.47367E 13	.29934E 13	.13085E 13	.41414E 12	.10525E 12
115.9	.53386E 13	.35835E 13	.18992E 13	.75345E 12	.23677E 12
140.2	.53011E 13	.41383E 13	.25817E 13	.12702E 13	.49991E 12
169.6	.55265E 13	.46310E 13	.32899E 13	.19511E 13	.95681E 12
205.1	.57194E 13	.50501E 13	.39601E 13	.27265E 13	.16228E 13
248.1	.58885E 13	.53997E 13	.45533E 13	.35063E 13	.24353E 13
300.0	.60529E 13	.57017E 13	.50661E 13	.42299E 13	.32930E 13

Table 6C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.28055E	6	.21451E	5	.19873E	4	.52604E	3	.41889E	3
1.5	.34789E	6	.26555E	5	.23769E	4	.57475E	3	.41889E	3
1.8	.43379E	6	.33141E	5	.28835E	4	.57475E	3	.41889E	3
2.1	.54436E	6	.41626E	5	.35654E	4	.64294E	3	.41889E	3
2.6	.68844E	6	.52867E	5	.44032E	4	.70139E	3	.41889E	3
3.1	.87890E	6	.67772E	5	.55916E	4	.80855E	3	.46759E	3
3.8	.11348E	7	.88064E	5	.71600E	4	.93519E	3	.46759E	3
4.6	.14851E	7	.11617E	6	.94201E	4	.10911E	4	.46759E	3
5.5	.19757E	7	.15609E	6	.12615E	5	.13833E	4	.46759E	3
6.7	.26804E	7	.21443E	6	.17389E	5	.17730E	4	.52604E	3
8.1	.37231E	7	.30247E	6	.24763E	5	.23769E	4	.57475E	3
9.8	.53188E	7	.44037E	6	.36511E	5	.33316E	4	.64294E	3
11.8	.78562E	7	.66568E	6	.56189E	5	.50851E	4	.80855E	3
14.3	.12071E	8	.10518E	7	.90869E	5	.81147E	4	.10911E	4
17.3	.19422E	8	.17507E	7	.15585E	6	.14077E	5	.15879E	4
20.9	.32958E	8	.30950E	7	.28588E	6	.26390E	5	.27861E	4
25.3	.59407E	8	.58607E	7	.56640E	6	.54163E	5	.54163E	4
30.6	.11447E	9	.11982E	8	.12231E	7	.12264E	6	.12440E	5
37.1	.23689E	9	.26620E	8	.29022E	7	.30904E	6	.32566E	5
44.8	.52744E	9	.64503E	8	.76082E	7	.87176E	6	.97844E	5
54.2	.12604E	10	.17038E	9	.22067E	8	.27607E	7	.33586E	6
65.5	.32069E	10	.48756E	9	.70500E	8	.97869E	7	.13134E	7
79.3	.85582E	10	.14912E	10	.24513E	9	.38434E	8	.57914E	7
95.9	.23415E	11	.47674E	10	.90796E	9	.16381E	9	.28235E	8
115.9	.63679E	11	.15443E	11	.34710E	10	.73398E	9	.14744E	9
140.2	.16570E	12	.48728E	11	.13143E	11	.33125E	10	.78894E	9
169.6	.39546E	12	.14314E	12	.46978E	11	.14303E	11	.40952E	10
205.1	.83219E	12	.37353E	12	.15066E	12	.55928E	11	.19426E	11
248.1	.15089E	13	.83267E	12	.41349E	12	.18795E	12	.79514E	11
300.0	.23676E	13	.15600E	13	.94006E	12	.52079E	12	.26797E	12

STOP

Table 6D

GRAPH OF ENERGY LEVELS VS. WC

(110) n-Si

DOUBLE BAND K1A = K2A = K1B = K3B = 0.190, K3A = K2B = 0.916

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 300.00 DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

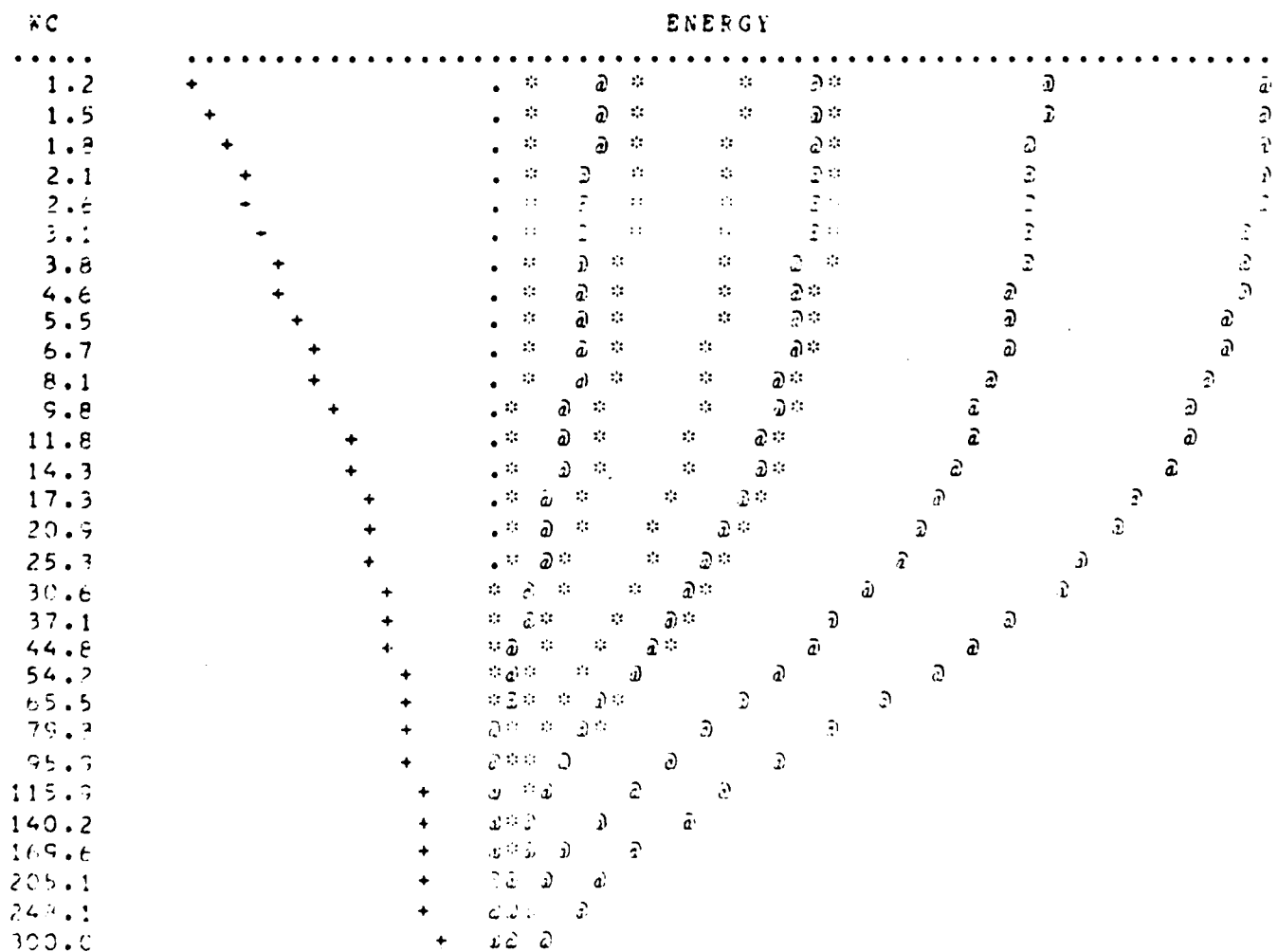


Figure 7

$w_c(\text{\AA})$	E_f	ECA(1)	ECA(2)	ECA(3)	ECA(4)	ECA(5)
1.2	-105.676	16.979	52.035	87.295	122.641	156.037
1.5	-101.007	16.801	51.718	86.984	122.152	157.481
1.8	-96.386	16.557	51.338	86.389	121.564	156.812
2.1	-91.823	16.333	50.882	85.794	120.856	156.007
2.6	-87.329	16.031	50.337	85.080	120.006	155.038
3.1	-82.916	15.674	49.694	84.225	118.985	153.875
3.8	-78.597	15.252	48.907	83.202	117.763	152.480
4.6	-74.390	14.758	47.984	81.982	116.302	150.809
5.5	-70.310	14.183	46.891	80.531	114.559	148.814
6.7	-66.376	13.519	45.604	78.811	112.487	146.437
8.1	-62.607	12.780	44.096	76.782	110.032	143.614
9.8	-59.022	11.903	42.341	74.400	107.137	140.275
11.8	-55.636	10.950	40.318	71.622	103.741	136.343
14.3	-52.464	9.910	38.009	68.407	99.784	131.741
17.3	-49.513	8.800	35.405	64.724	95.211	126.392
20.9	-46.784	7.647	32.517	60.554	89.977	120.229
25.3	-44.267	6.485	29.371	55.899	84.059	113.203
30.6	-41.947	5.357	26.022	50.795	77.467	105.297
37.1	-39.802	4.305	22.553	45.317	70.254	96.540
44.8	-37.811	3.366	19.073	39.586	62.534	87.025
54.2	-35.957	2.563	15.708	33.769	54.484	76.925
65.5	-34.237	1.906	12.584	28.071	46.345	66.497
79.3	-32.657	1.389	9.809	22.704	38.405	56.076
95.9	-31.225	.996	7.449	17.862	30.963	46.043
115.9	-29.941	.704	5.526	13.683	24.284	36.774
140.2	-28.791	.493	4.019	10.229	18.547	28.577
169.6	-27.740	.343	2.876	7.487	13.829	21.642
205.1	-26.735	.238	2.032	5.385	10.100	16.018
248.1	-25.712	.164	1.422	3.821	7.252	11.626
300.0	-24.605	.113	.989	2.682	5.136	8.306

Table 7A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECA(6)	ECA(7)	ECA(8)	ECA(9)	ECA(10)
1.2	193.467	228.921	264.395	299.885	335.337
1.5	192.851	228.251	263.675	299.117	334.575
1.8	192.110	227.444	262.807	298.192	333.596
2.1	191.217	226.472	261.760	297.077	332.416
2.6	190.143	225.301	260.500	295.733	330.994
3.1	188.852	223.893	258.985	294.117	329.282
3.8	187.302	222.203	257.164	292.174	327.224
4.6	185.445	220.176	254.979	289.841	324.753
5.5	183.225	217.749	252.361	287.045	321.789
6.7	180.575	214.850	249.232	283.701	318.240
8.1	177.422	211.397	245.501	279.708	314.002
9.8	173.685	207.296	241.064	274.957	308.954
11.8	169.274	202.446	235.807	269.320	302.959
14.3	164.093	196.737	229.608	262.662	295.868
17.3	158.049	190.056	222.336	254.837	287.521
20.9	151.050	182.293	213.863	245.698	277.753
25.3	143.025	173.350	204.068	235.104	266.403
30.6	133.929	163.160	192.859	222.937	253.330
37.1	123.766	151.698	180.184	209.121	238.433
44.8	112.606	139.010	166.064	193.649	221.677
54.2	100.606	125.234	150.614	176.612	203.129
65.5	88.027	110.622	134.074	158.234	182.992
79.3	75.230	95.552	116.825	138.892	161.635
95.9	62.658	80.509	99.364	119.125	139.609
115.9	50.782	66.045	82.367	99.599	117.624
140.2	40.033	52.701	66.415	81.046	96.436
169.6	30.725	40.918	52.094	64.146	76.987
205.1	23.008	30.964	39.793	49.417	59.772
248.1	16.865	22.900	29.673	37.132	45.228
300.0	12.144	16.612	21.673	27.295	33.449

Table 7B

ENERGY IN MILLI-ELECTRON VOLTS
 MC IN ANGSTROMS

MC	ECB(1)	ECB(2)	ECF(3)	ECB(4)	ECF(5)
1.2	37.897	119.339	193.065	270.957	348.902
1.5	37.628	114.865	192.470	270.227	348.074
1.8	37.305	114.225	191.729	269.348	347.075
2.1	36.916	113.609	190.837	268.289	345.871
2.4	36.456	112.735	189.764	267.013	344.420
3.1	35.904	111.796	188.474	265.479	342.674
3.8	35.249	110.612	186.926	263.634	340.574
4.6	34.473	109.195	185.072	261.421	338.051
5.5	33.557	107.511	182.853	258.770	335.025
6.7	32.484	105.507	180.206	255.600	331.403
8.1	31.234	103.135	177.057	251.819	327.075
9.8	29.789	100.339	173.324	247.322	321.917
11.9	28.137	97.063	168.917	241.994	315.790
14.3	26.270	93.250	163.743	235.708	308.541
17.3	24.192	88.649	157.705	228.331	300.002
20.9	21.921	83.822	150.716	219.731	290.004
25.3	19.493	78.150	142.701	209.785	278.376
30.6	16.965	71.849	133.617	198.394	264.971
37.1	14.412	64.977	123.469	185.504	249.676
44.8	11.927	57.649	112.325	171.128	232.447
54.2	9.603	50.044	100.345	155.379	213.341
65.5	7.521	42.396	87.789	138.492	192.554
79.3	5.738	34.981	75.017	120.850	170.449
95.9	4.273	28.078	62.472	102.973	147.521
115.9	3.118	21.925	50.624	85.489	124.672
140.2	2.237	16.679	39.903	69.055	102.557
169.6	1.584	12.392	30.621	54.259	82.066
205.1	1.110	9.023	22.928	41.514	63.832
248.1	.773	6.463	16.804	31.002	48.469
300.0	.535	4.671	12.100	22.071	35.925

Table 7C

ENERGY IN MILLI-ELECTRON VOLTS
 Å IN ÅNGSTRÖMS

Å	ECB(6)	ECB(7)	ECB(8)	ECB(9)	ECB(10)
1.2	426.899	504.932	582.993	661.078	739.182
1.5	425.982	503.934	581.921	659.936	737.974
1.8	424.876	502.731	580.627	658.558	736.516
2.1	423.542	501.279	579.066	656.394	734.756
2.6	421.735	499.529	577.184	654.388	732.634
3.1	419.999	497.420	574.915	652.470	730.075
3.8	417.670	494.882	572.184	649.558	726.992
4.6	414.871	491.730	568.898	646.053	723.281
5.5	411.510	488.184	564.949	641.840	718.819
6.7	407.483	483.768	560.211	636.782	713.459
8.1	402.866	478.504	554.534	630.718	707.031
9.8	396.917	472.216	547.746	623.463	699.335
11.8	390.076	464.723	539.650	614.802	690.141
14.3	381.985	455.824	530.021	604.491	679.187
17.3	372.386	445.299	518.612	592.257	666.176
20.9	361.133	432.896	505.151	577.802	650.732
25.3	347.997	418.360	489.394	560.906	632.655
30.6	332.730	401.503	470.937	540.946	611.432
37.1	315.318	382.052	449.637	517.912	586.759
44.8	295.508	359.887	425.242	491.440	558.322
54.2	273.350	334.890	397.633	461.355	525.891
65.9	248.986	307.887	366.841	427.828	489.377
79.3	222.749	277.101	333.104	390.444	448.910
95.9	195.193	245.128	296.929	350.270	404.912
115.9	167.099	212.070	259.129	307.913	358.163
140.2	139.427	179.000	220.821	264.528	309.860
169.6	113.215	147.120	183.348	221.570	261.527
205.1	89.919	117.818	148.120	180.836	214.931
248.1	68.750	91.487	118.197	142.239	171.821
300.0	51.585	69.767	89.007	110.547	133.893

Table 7D

ELECTRON CONCENTRATION/SQUARE CENTIMETER
 ÅC IN ÅNGSTRÖMS

WC	NA1	NA2	NA3	NA4	NA5
1.2	.17736E 11	.45827E 10	.11720E 10	.29855E 9	.75093E 8
1.5	.21376E 11	.55587E 10	.14265E 10	.36450E 9	.92899E 8
1.8	.25746E 11	.67411E 10	.17387E 10	.44589E 9	.11400E 9
2.1	.30982E 11	.81031E 10	.21225E 10	.54675E 9	.14032E 9
2.4	.37243E 11	.99410E 10	.25961E 10	.67235E 9	.17335E 9
3.1	.44712E 11	.12087E 11	.31527E 10	.82965E 9	.21510E 9
3.5	.53596E 11	.14712E 11	.39127E 10	.10280E 10	.26031E 9
4.0	.64125E 11	.17929E 11	.48281E 10	.12801E 10	.33683E 9
5.5	.76548E 11	.21831E 11	.59782E 10	.16034E 10	.42608E 9
6.7	.91128E 11	.26749E 11	.74350E 10	.20227E 10	.54302E 9
8.1	.10813E 12	.32780E 11	.93009E 10	.25731E 10	.70164E 9
9.9	.12779E 12	.40201E 11	.11710E 11	.33059E 10	.91750E 9
11.1	.15030E 12	.49454E 11	.14853E 11	.42960E 10	.12178E 10
14.3	.17580E 12	.60987E 11	.18997E 11	.56598E 10	.16451E 10
17.3	.20427E 12	.75319E 11	.24524E 11	.75693E 10	.22878E 10
20.5	.23555E 12	.93200E 11	.31971E 11	.10294E 11	.31985E 10
25.3	.26931E 12	.11540E 12	.42092E 11	.14253E 11	.46255E 10
30.6	.30502E 12	.14274E 12	.55910E 11	.20094E 11	.68671E 10
37.1	.34201E 12	.17592E 12	.74747E 11	.28600E 11	.10462E 11
44.6	.37950E 12	.21530E 12	.10016E 12	.41805E 11	.16307E 11
54.2	.41667E 12	.26054E 12	.13366E 12	.61043E 11	.25037E 11
65.1	.45268E 12	.31836E 12	.17624E 12	.88789E 11	.41137E 11
78.3	.48673E 12	.38257E 12	.22787E 12	.12712E 12	.65148E 11
95.9	.51820E 12	.41443E 12	.28604E 12	.17702E 12	.10064E 12
115.0	.54677E 12	.46341E 12	.34794E 12	.23733E 12	.14959E 12
140.2	.57257E 12	.50705E 12	.40343E 12	.30465E 12	.21150E 12
169.0	.59621E 12	.54733E 12	.46728E 12	.37427E 12	.28301E 12
205.1	.61890E 12	.58265E 12	.51908E 12	.44192E 12	.35489E 12
248.1	.64182E 12	.61545E 12	.56778E 12	.50517E 12	.43423E 12
300.0	.66686E 12	.64779E 12	.61226E 12	.56371E 12	.50402E 12

Table 7E

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NA6		NA7		NA8		NA9		NA10	
1.2	.19267E	8	.48865E	7	.12355E	7	.31385E	6	.79616E	5
1.5	.23638E	8	.60079E	7	.15257E	7	.38729E	6	.98360E	5
1.8	.29089E	8	.74121E	7	.18867E	7	.47993E	6	.12212E	6
2.1	.35926E	8	.91823E	7	.23440E	7	.59783E	6	.15248E	6
2.6	.44565E	8	.11433E	8	.29285E	7	.74928E	6	.19163E	6
3.1	.55571E	8	.14321E	8	.36935E	7	.94612E	6	.24282E	6
3.6	.69736E	8	.18070E	8	.46713E	7	.12054E	7	.31070E	6
4.6	.88161E	8	.23000E	8	.59822E	7	.15525E	7	.40223E	6
5.5	.11253E	9	.29885E	8	.77519E	7	.20257E	7	.52825E	6
6.7	.14517E	9	.38339E	8	.10188E	8	.26346E	7	.70555E	6
8.1	.18976E	9	.50004E	8	.13619E	8	.36247E	7	.96173E	6
9.8	.25191E	9	.66618E	8	.18577E	8	.50044E	7	.13431E	7
11.6	.34082E	9	.94387E	8	.25993E	8	.70559E	7	.19300E	7
14.3	.47057E	9	.13307E	9	.37297E	8	.10370E	8	.28721E	7
17.2	.66846E	9	.19317E	9	.55394E	8	.15750E	8	.44466E	7
20.9	.97101E	9	.28991E	9	.85455E	8	.24931E	8	.72121E	7
25.3	.14599E	10	.45168E	9	.13760E	9	.41407E	8	.12333E	8
30.6	.22703E	10	.73285E	9	.23226E	9	.72531E	8	.22375E	8
37.1	.36541E	10	.12408E	10	.41210E	9	.13451E	9	.43267E	8
44.8	.60751E	10	.21890E	10	.76866E	9	.26437E	9	.89374E	8
54.2	.10373E	11	.40060E	10	.15012E	10	.54909E	9	.16882E	9
65.5	.15005E	11	.75299E	10	.30419E	10	.11949E	10	.45890E	9
79.3	.31353E	11	.14318E	11	.62953E	10	.26839E	10	.11136E	10
95.7	.53527E	11	.27002E	11	.13052E	11	.60908E	10	.27592E	10
115.9	.83312E	11	.49393E	11	.26413E	11	.13601E	11	.67425E	10
140.2	.13825E	12	.89779E	11	.50988E	11	.29045E	11	.18031E	11
169.6	.20314E	12	.13911E	12	.91840E	11	.57760E	11	.35348E	11
205.1	.27934E	12	.20995E	12	.15074E	12	.10477E	12	.70001E	11
248.1	.36114E	12	.30098E	12	.22746E	12	.17277E	12	.10771E	12
300.0	.44318E	12	.37891E	12	.31643E	12	.25378E	12	.20621E	12

Table 7F

ELUTION CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	SE1	SE2	SE3	SE4	SE5
1.2	.17375E 11	.86955E 9	.42933E 8	.21096E 7	.10314E 6
1.5	.21026E 11	.10610E 10	.52674E 8	.25994E 7	.12628E 6
1.7	.25446E 11	.13670E 10	.64410E 8	.32160E 7	.15934E 6
2.1	.30799E 11	.15991E 10	.80051E 8	.39970E 7	.19907E 6
2.6	.37294E 11	.19521E 10	.99094E 8	.49478E 7	.25043E 6
3.1	.45142E 11	.24038E 10	.12381E 9	.62911E 7	.31776E 6
3.8	.54164E 11	.29764E 10	.15536E 9	.79851E 7	.40720E 6
4.6	.66206E 11	.36995E 10	.19644E 9	.10237E 8	.52613E 6
5.5	.80199E 11	.46236E 10	.25065E 9	.13263E 8	.69517E 6
6.7	.97162E 11	.58174E 10	.32334E 9	.17485E 8	.93110E 6
8.1	.11772E 12	.73766E 10	.42258E 9	.23418E 8	.12735E 7
9.9	.14262E 12	.94405E 10	.56091E 9	.32015E 8	.17860E 7
11.8	.17273E 12	.12213E 11	.75628E 9	.44853E 8	.25804E 7
14.3	.20907E 12	.15995E 11	.10473E 10	.64676E 8	.32620E 7
17.3	.25274E 12	.21247E 11	.14029E 10	.96449E 8	.60238E 7
20.9	.30491E 12	.28662E 11	.21598E 10	.14952E 9	.98575E 7
25.3	.36655E 12	.39300E 11	.32460E 10	.24217E 9	.17039E 8
30.6	.43873E 12	.54769E 11	.50454E 10	.41165E 9	.31312E 8
37.1	.52129E 12	.77441E 11	.81161E 10	.73652E 9	.61489E 8
44.8	.61345E 12	.11086E 12	.13484E 11	.13875E 10	.12936E 9
54.2	.71298E 12	.15872E 12	.23007E 11	.27415E 10	.29108E 9
65.5	.81629E 12	.22634E 12	.39899E 11	.56302E 10	.69541E 9
79.3	.91890E 12	.31732E 12	.69297E 11	.11837E 11	.17397E 10
95.9	.10164E 13	.43245E 12	.11837E 12	.24952E 11	.44510E 10
115.3	.11058E 13	.56788E 12	.19507E 12	.51432E 11	.11342E 11
140.2	.11850E 13	.71529E 12	.30504E 12	.10101E 12	.27853E 11
169.6	.12555E 13	.86454E 12	.44774E 12	.18476E 12	.63649E 11
205.1	.13190E 13	.10073E 13	.61513E 12	.31015E 12	.13308E 12
248.1	.13810E 13	.11849E 13	.79686E 12	.47568E 12	.24825E 12
300.0	.14439E 13	.12617E 13	.97661E 12	.67033E 12	.41324E 12

Table 7G

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NE6		NE7		NE8		NE9		NE10	
1.2	.55420E	4	.74953E	3	.48833E	3	.48833E	3	.48833E	3
1.5	.67685E	4	.81707E	3	.48833E	3	.48833E	3	.48833E	3
1.8	.82903E	4	.88581E	3	.48833E	3	.48833E	3	.48833E	3
2.1	.10323E	5	.94259E	3	.48833E	3	.48833E	3	.48833E	3
2.6	.12935E	5	.10902E	4	.48833E	3	.48833E	3	.48833E	3
3.1	.16410E	5	.12719E	4	.54511E	3	.48833E	3	.48833E	3
3.8	.21066E	5	.15445E	4	.54511E	3	.48833E	3	.48833E	3
4.6	.27483E	5	.18511E	4	.54511E	3	.48833E	3	.48833E	3
5.5	.36466E	5	.23167E	4	.54511E	3	.48833E	3	.48833E	3
6.7	.49492E	5	.30435E	4	.61325E	3	.48833E	3	.48833E	3
8.1	.68775E	5	.40883E	4	.67003E	3	.48833E	3	.48833E	3
9.8	.90518E	5	.57918E	4	.74553E	3	.48833E	3	.48833E	3
11.8	.14611E	6	.86155E	4	.94259E	3	.48833E	3	.48833E	3
14.3	.22580E	6	.13389E	5	.12036E	4	.54511E	3	.48833E	3
17.3	.36644E	6	.22236E	5	.17262E	4	.54511E	3	.48833E	3
20.9	.62911E	6	.39800E	5	.28391E	4	.61325E	3	.48833E	3
25.3	.11524E	7	.75123E	5	.53376E	4	.81767E	3	.48833E	3
30.6	.22711E	7	.15941E	6	.11258E	5	.12036E	4	.54511E	3
37.1	.48495E	7	.36710E	6	.27278E	5	.23549E	4	.61325E	3
44.8	.11273E	8	.93470E	6	.74942E	5	.62574E	4	.94259E	3
54.2	.28543E	8	.26391E	7	.23326E	6	.20271E	5	.21237E	4
65.5	.78328E	8	.82321E	7	.81955E	6	.78417E	5	.76316E	4
79.3	.22901E	9	.28048E	8	.32129E	7	.34979E	6	.36852E	5
95.9	.70551E	9	.10215E	9	.13767E	8	.17479E	7	.21145E	6
115.4	.21985E	10	.38550E	9	.62466E	8	.94559E	7	.13533E	7
140.2	.67031E	10	.14502E	10	.28757E	9	.52996E	8	.91716E	7
169.6	.19224E	11	.51849E	10	.12767E	10	.29095E	9	.61994E	8
205.1	.50021E	11	.16860E	11	.51858E	10	.14742E	10	.39109E	9
248.1	.11496E	12	.48045E	11	.18346E	11	.65156E	10	.21570E	10
300.0	.23030E	12	.11720E	12	.55024E	11	.24046E	11	.98543E	10

Table 7H

GRAPH OF ENERGY LEVELS VS. WC
(110) n-Si

DOUBLE BAND $K_{1A} = K_{2A} = K_{1B} = K_{3B} = 0.190$, $K_{3A} = K_{2B} = 0.916$

DONOR CONCENTRATION = 1×10^{19} /CUBIC CENTIMETER
TEMPERATURE = 300.00 DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

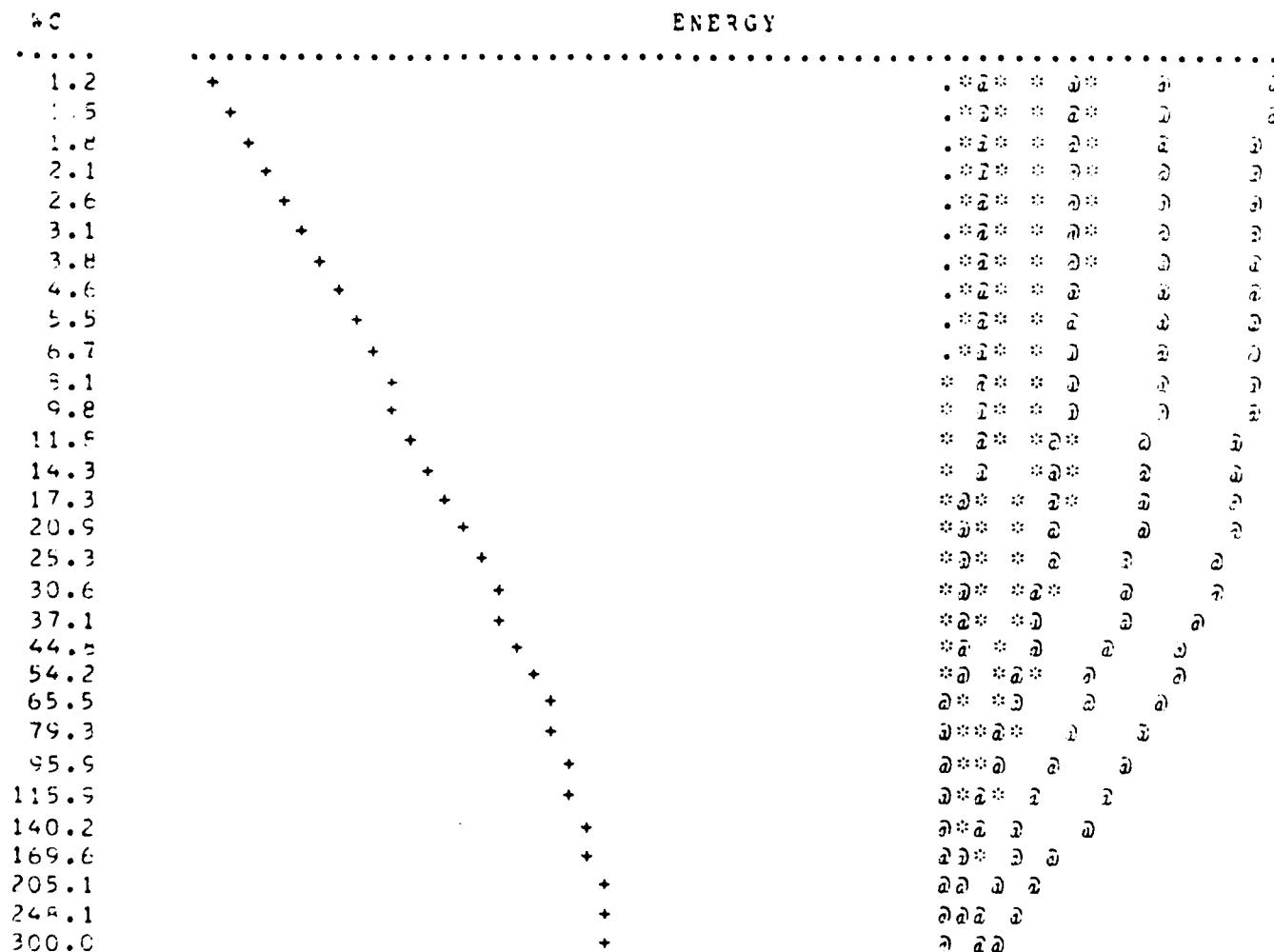


Figure 8

$w_c(\text{\AA})$	E_f	ECA(1)	ECA(2)	ECA(3)	ECA(4)	ECA(5)
1.2	-199.839	5.489	16.666	27.879	39.108	50.345
1.5	-194.991	5.457	16.609	27.805	39.020	50.245
1.8	-190.157	5.416	16.540	27.716	38.914	50.125
2.1	-185.340	5.371	16.457	27.608	38.786	49.980
2.6	-180.542	5.315	16.358	27.479	38.633	49.805
3.1	-175.767	5.247	16.238	27.323	38.448	49.595
3.8	-171.021	5.167	16.095	27.136	38.225	49.341
4.6	-166.308	5.072	15.923	26.912	37.957	49.037
5.5	-161.635	4.960	15.718	26.642	37.636	48.671
6.7	-157.010	4.827	15.473	26.321	37.252	48.232
8.1	-152.440	4.672	15.183	25.937	36.792	47.706
9.8	-147.937	4.490	14.839	25.480	36.243	47.076
11.8	-143.510	4.281	14.433	24.939	35.591	46.330
14.3	-139.173	4.042	13.959	24.300	34.818	45.442
17.3	-134.939	3.772	13.406	23.550	33.907	44.390
20.9	-130.823	3.471	12.769	22.675	32.838	43.153
25.3	-126.839	3.143	12.041	21.662	31.592	41.704
30.6	-123.004	2.793	11.220	20.502	30.151	40.019
37.1	-119.331	2.428	10.309	19.187	28.502	38.077
44.8	-115.833	2.061	9.316	17.720	26.637	35.863
54.2	-112.521	1.704	8.259	16.109	24.558	33.371
65.5	-109.403	1.370	7.163	14.360	22.282	30.609
79.3	-106.484	1.072	6.062	12.569	19.844	27.606
95.9	-103.763	.817	4.996	10.730	17.301	24.416
115.9	-101.236	.608	4.006	8.926	14.726	21.120
140.2	-98.891	.443	3.124	7.225	12.213	17.823
169.6	-96.709	.318	2.374	5.683	9.854	14.645
205.1	-94.662	.225	1.763	4.361	7.734	11.706
248.1	-92.710	.156	1.282	3.262	5.911	9.104
300.0	-90.801	.110	.918	2.389	4.410	6.899

Table 8A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECA(6)	ECA(7)	ECA(8)	ECA(9)	ECA(10)
1.2	61.588	72.836	84.087	95.341	106.597
1.5	61.478	72.716	83.958	95.204	106.452
1.8	61.345	72.571	83.803	95.038	106.277
2.1	61.184	72.397	83.615	94.838	106.065
2.6	60.991	72.186	83.388	94.597	105.810
3.1	60.758	71.932	83.115	94.305	105.502
3.8	60.477	71.626	82.786	93.955	105.130
4.6	60.139	71.258	82.390	93.532	104.683
5.5	59.733	70.815	81.913	93.023	104.145
6.7	59.245	70.283	81.340	92.412	103.497
8.1	58.661	69.645	80.652	91.675	102.719
9.8	57.962	68.981	79.829	90.798	101.787
11.8	57.128	67.969	78.844	89.746	100.670
14.3	56.136	66.882	77.670	88.490	99.337
17.3	54.960	65.592	76.273	86.994	97.748
20.9	53.571	64.065	74.619	85.220	95.861
25.3	51.940	62.268	72.667	83.124	93.629
30.6	50.036	60.164	70.378	80.661	91.001
37.1	47.832	57.719	67.709	77.783	87.925
44.3	45.303	54.902	64.624	74.446	84.351
54.2	42.437	51.690	61.092	70.612	80.232
65.5	39.232	48.077	57.097	66.258	75.538
79.3	35.711	44.075	52.644	61.380	70.255
95.9	31.922	39.727	47.769	56.005	64.405
115.9	27.948	35.113	42.547	50.204	58.049
140.2	23.902	30.349	37.096	44.094	51.304
169.6	19.922	25.589	31.590	37.844	44.342
205.1	16.159	21.008	26.192	31.664	37.386
248.1	12.748	16.776	21.136	25.735	30.691
300.0	9.791	13.035	16.591	20.424	24.507

Table 8B

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECB(1)	ECB(2)	ECB(3)	ECB(4)	ECB(5)
1.2	12.164	36.788	61.467	86.168	110.882
1.5	12.115	36.703	61.357	86.037	110.734
1.8	12.057	36.601	61.224	85.880	110.555
2.1	11.986	36.477	61.064	85.690	110.339
2.6	11.902	36.328	60.870	85.460	110.079
3.1	11.800	36.149	60.637	85.184	109.764
3.8	11.678	35.933	60.357	84.851	109.386
4.6	11.533	35.674	60.019	84.449	108.929
5.5	11.359	35.362	59.613	83.966	108.380
6.7	11.153	34.990	59.126	83.386	107.719
8.1	10.909	34.545	58.542	82.690	106.925
9.8	10.620	34.014	57.844	81.856	105.973
11.8	10.282	33.383	57.011	80.858	104.833
14.3	9.889	32.637	56.020	79.668	103.471
17.3	9.434	31.756	54.845	78.253	101.848
20.9	8.913	30.725	53.458	76.576	99.920
25.3	8.325	29.524	51.829	74.597	97.638
30.6	7.669	28.138	49.928	72.274	94.950
37.1	6.953	26.554	47.726	69.566	91.801
44.8	6.186	24.766	45.201	66.433	88.140
54.2	5.367	22.778	42.338	62.844	83.916
65.5	4.580	20.610	39.138	58.781	79.097
79.3	3.793	18.296	35.622	54.247	73.665
95.9	3.056	15.892	31.840	49.278	67.639
115.9	2.396	13.473	27.873	43.947	61.079
140.2	1.829	11.125	23.834	38.373	54.099
169.6	1.363	8.937	19.863	32.719	46.871
205.1	.995	6.984	16.108	27.184	39.623
248.1	.714	5.316	12.707	21.975	32.620
300.0	.506	3.952	9.758	17.280	26.122

Table 8C

ENERGY IN MILLI-ELECTRON VOLTS
 WC IN ANGSTROMS

WC	ECB(6)	ECB(7)	ECB(8)	ECB(9)	ECB(10)
1.2	135.605	160.335	185.069	209.808	234.550
1.5	135.441	160.156	184.878	209.604	234.335
1.8	135.243	159.941	184.647	209.355	234.074
2.1	135.004	159.681	184.367	209.060	233.760
2.6	134.716	159.368	184.030	208.701	233.380
3.1	134.368	158.989	183.623	208.267	232.921
3.8	133.949	158.532	183.132	207.744	232.367
4.6	133.443	157.982	182.540	207.113	231.699
5.5	132.834	157.318	181.826	206.352	230.894
6.7	132.101	156.520	180.967	205.436	229.925
8.1	131.220	155.560	179.933	204.334	228.757
9.8	130.163	154.406	178.690	203.008	227.353
11.8	128.896	153.023	177.200	201.417	225.667
14.3	127.380	151.366	175.413	199.509	223.644
17.3	125.571	149.388	173.277	197.226	221.223
20.9	123.418	147.030	170.729	194.500	218.330
25.3	120.865	144.229	167.699	191.255	214.882
30.6	117.850	140.914	164.108	187.404	210.787
37.1	114.307	137.011	159.870	182.854	205.941
44.8	110.170	132.440	154.896	177.503	200.234
54.2	105.377	127.125	149.097	171.249	193.552
65.5	99.875	120.997	142.387	163.994	185.781
79.3	93.632	114.006	134.701	155.654	176.823
95.9	86.645	106.132	125.998	146.172	166.603
115.9	78.958	97.401	116.286	135.538	155.092
140.2	70.676	87.902	105.644	123.809	142.328
169.6	61.970	77.803	94.223	111.128	128.443
205.1	53.087	67.356	82.279	97.748	113.681
248.1	44.329	56.893	70.164	84.032	98.412
300.0	36.022	46.794	58.301	70.437	83.121

Table 8D

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NA1		NA2		NA3		NA4		NA5	
1.2	.72664E	9	.47154E	9	.30556E	9	.19788E	9	.12810E	9
1.5	.87763E	9	.57007E	9	.36965E	9	.23952E	9	.15513E	9
1.8	.10597E	10	.68914E	9	.44721E	9	.28996E	9	.18791E	9
2.1	.12791E	10	.83298E	9	.54109E	9	.35111E	9	.22769E	9
2.6	.15433E	10	.10064E	10	.65473E	9	.42525E	9	.27600E	9
3.1	.18611E	10	.12166E	10	.79232E	9	.51521E	9	.33471E	9
3.8	.22431E	10	.14699E	10	.95894E	9	.62442E	9	.40615E	9
4.6	.27014E	10	.17756E	10	.11808E	10	.75712E	9	.49317E	9
5.5	.32506E	10	.21443E	10	.14053E	10	.91848E	9	.59933E	9
6.7	.39071E	10	.25867E	10	.17017E	10	.11149E	10	.72906E	9
8.1	.46900E	10	.31239E	10	.20611E	10	.13544E	10	.88792E	9
9.8	.56209E	10	.37679E	10	.24919E	10	.16467E	10	.10829E	10
11.8	.67235E	10	.45417E	10	.30258E	10	.20041E	10	.13229E	10
14.3	.80235E	10	.54700E	10	.36677E	10	.24420E	10	.16192E	10
17.3	.95477E	10	.65812E	10	.44470E	10	.29796E	10	.19865E	10
20.9	.11322E	11	.79076E	10	.53931E	10	.36411E	10	.24435E	10
25.3	.13371E	11	.94855E	10	.65415E	10	.44569E	10	.30148E	10
30.6	.15714E	11	.11353E	11	.79340E	10	.54651E	10	.37320E	10
37.1	.18359E	11	.13549E	11	.96191E	10	.67129E	10	.46367E	10
44.8	.21306E	11	.16111E	11	.11651E	11	.82581E	10	.57820E	10
54.2	.24536E	11	.19064E	11	.14087E	11	.10163E	11	.72354E	10
65.5	.28018E	11	.22423E	11	.16982E	11	.12521E	11	.90799E	10
79.3	.31704E	11	.26173E	11	.20376E	11	.15395E	11	.11412E	11
95.9	.35541E	11	.30273E	11	.24285E	11	.18357E	11	.14335E	11
115.9	.39472E	11	.34650E	11	.28685E	11	.22950E	11	.17942E	11
140.2	.43455E	11	.39213E	11	.33507E	11	.27665E	11	.22295E	11
169.6	.47466E	11	.43874E	11	.38643E	11	.32938E	11	.27399E	11
205.1	.51512E	11	.48572E	11	.43976E	11	.38645E	11	.33183E	11
248.1	.55643E	11	.53304E	11	.49420E	11	.44657E	11	.39517E	11
300.0	.59957E	11	.58137E	11	.54983E	11	.50979E	11	.46260E	11

Table 8E

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

	NA6		NA7		NA8		NA9		NA10	
1.2	.82913E	8	.53654E	8	.34716E	8	.22460E	8	.14529E	8
1.5	.10045E	9	.65826E	8	.42088E	8	.27233E	8	.17626E	8
1.8	.12173E	9	.78840E	8	.51051E	8	.33052E	8	.21396E	8
2.1	.14759E	9	.95640E	8	.61861E	8	.40134E	8	.25992E	8
2.6	.17903E	9	.11609E	9	.75258E	8	.48775E	8	.31805E	8
3.1	.21731E	9	.14103E	9	.91491E	8	.59337E	8	.38474E	8
3.8	.26398E	9	.17148E	9	.11135E	9	.72274E	8	.46900E	8
4.6	.32095E	9	.20874E	9	.13563E	9	.88163E	8	.57265E	8
5.5	.39065E	9	.25443E	9	.16560E	9	.10774E	9	.70060E	8
6.7	.47611E	9	.31062E	9	.20250E	9	.13194E	9	.85917E	8
8.1	.58113E	9	.37996E	9	.24818E	9	.16199E	9	.10567E	9
9.8	.71076E	9	.46535E	9	.30499E	9	.19950E	9	.13041E	9
11.8	.87119E	9	.57273E	9	.37603E	9	.24662E	9	.16160E	9
14.3	.10707E	10	.70646E	9	.46541E	9	.30621E	9	.20125E	9
17.3	.13199E	10	.87491E	9	.57868E	9	.38220E	9	.25211E	9
20.9	.16331E	10	.10882E	10	.72344E	9	.48003E	9	.31803E	9
25.3	.20293E	10	.13610E	10	.91018E	9	.60733E	9	.40449E	9
30.6	.25336E	10	.17125E	10	.11535E	10	.77493E	9	.51942E	9
37.1	.31801E	10	.21696E	10	.14743E	10	.99847E	9	.67440E	9
44.8	.40144E	10	.27698E	10	.19018E	10	.13007E	10	.88665E	9
54.2	.50973E	10	.35644E	10	.24780E	10	.17147E	10	.11819E	10
65.5	.65079E	10	.46238E	10	.32626E	10	.22893E	10	.15989E	10
78.3	.83460E	10	.60417E	10	.43385E	10	.30950E	10	.21959E	10
93.9	.10730E	11	.79388E	10	.58188E	10	.42324E	10	.30583E	10
115.9	.13790E	11	.10459E	11	.78497E	10	.58396E	10	.43122E	10
140.2	.17642E	11	.13760E	11	.10606E	11	.80952E	10	.61272E	10
167.6	.22366E	11	.17981E	11	.14274E	11	.11210E	11	.87227E	10
200.1	.27967E	11	.23209E	11	.19010E	11	.15396E	11	.12347E	11
246.1	.34363E	11	.29438E	11	.24896E	11	.20817E	11	.17233E	11
300.0	.41411E	11	.36569E	11	.31905E	11	.27536E	11	.23534E	11

Table 8F

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NE1	NE2	NH3	NH4	NH5
1.2	.12323E 10	.47528E 9	.18291E 9	.70329E 8	.27028E 8
1.5	.14894E 10	.57522E 9	.22159E 9	.85203E 8	.32792E 8
1.8	.17997E 10	.69829E 9	.26854E 9	.10344E 9	.39811E 8
2.1	.21743E 10	.84298E 9	.32558E 9	.12555E 9	.48371E 8
2.6	.26264E 10	.10208E 10	.39494E 9	.15251E 9	.58829E 8
3.1	.31716E 10	.12365E 10	.47938E 9	.18543E 9	.71632E 8
3.8	.38287E 10	.14982E 10	.58231E 9	.22571E 9	.87345E 8
4.6	.46202E 10	.18160E 10	.70799E 9	.27510E 9	.10669E 9
5.5	.55727E 10	.22021E 10	.86172E 9	.33584E 9	.13058E 9
6.7	.67175E 10	.26719E 10	.10502E 10	.41078E 9	.16021E 9
8.1	.80917E 10	.32439E 10	.12819E 10	.50362E 9	.19717E 9
9.8	.97384E 10	.39412E 10	.15677E 10	.61916E 9	.24351E 9
11.8	.11707E 11	.47927E 10	.19215E 10	.76374E 9	.30204E 9
14.3	.14056E 11	.58340E 10	.23614E 10	.94535E 9	.37656E 9
17.3	.16847E 11	.71096E 10	.29110E 10	.11769E 10	.47234E 9
20.9	.20150E 11	.86753E 10	.36015E 10	.14726E 10	.59680E 9
25.3	.24040E 11	.10600E 11	.44748E 10	.18547E 10	.76053E 9
30.6	.28589E 11	.12970E 11	.55863E 10	.23536E 10	.97889E 9
37.1	.33861E 11	.15891E 11	.70111E 10	.30127E 10	.12746E 10
44.8	.39909E 11	.19490E 11	.88494E 10	.38935E 10	.16814E 10
54.2	.46754E 11	.23914E 11	.11235E 11	.50845E 10	.22504E 10
65.5	.54377E 11	.29325E 11	.14341E 11	.67120E 10	.30592E 10
79.3	.62704E 11	.36611E 11	.18388E 11	.89534E 10	.42256E 10
95.9	.71610E 11	.43712E 11	.23636E 11	.12052E 11	.59266E 10
115.9	.80928E 11	.50880E 11	.30366E 11	.16328E 11	.84216E 10
140.2	.90493E 11	.63330E 11	.38938E 11	.22169E 11	.12077E 11
169.6	.10014E 12	.74908E 11	.49221E 11	.29994E 11	.17371E 11
209.1	.10932E 12	.87327E 11	.61525E 11	.40175E 11	.24069E 11
249.1	.11981E 12	.10031E 12	.75570E 11	.52929E 11	.35123E 11
300.0	.12967E 12	.11369E 12	.91042E 11	.68224E 11	.49561E 11

Table 8G

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NE6	NE7	NE8	NE9	NE10
1.2	.10384E 6	.39883E 7	.15318E 7	.58840E 6	.22819E 6
1.5	.12605E 8	.48444E 7	.18615E 7	.71535E 6	.27501E 6
1.8	.15315E 8	.58895E 7	.22644E 7	.87060E 6	.33486E 6
2.1	.19624E 8	.71880E 7	.27580E 7	.10611E 7	.40832E 6
2.6	.22676E 8	.87357E 7	.33642E 7	.12953E 7	.49574E 6
3.1	.27647E 8	.10663E 8	.41110E 7	.15844E 7	.61062E 6
3.8	.33764E 8	.13042E 8	.50344E 7	.19428E 7	.74950E 6
4.6	.41319E 8	.15908E 8	.61816E 7	.23194E 7	.92290E 6
5.5	.50689E 8	.19654E 8	.78140E 7	.29477E 7	.11407E 7
6.7	.62363E 8	.24244E 8	.94182E 7	.36526E 7	.14183E 7
8.1	.77011E 8	.30028E 8	.11603E 8	.45489E 7	.17632E 7
9.8	.95500E 8	.37377E 8	.14649E 8	.56998E 7	.22222E 7
11.8	.11904E 9	.46709E 8	.18363E 8	.71943E 7	.28152E 7
14.3	.14930E 9	.59314E 8	.23273E 8	.91606E 7	.36005E 7
17.3	.18963E 9	.75052E 8	.29776E 8	.11788E 8	.46580E 7
20.9	.24041E 9	.98419E 8	.38536E 8	.15361E 8	.61092E 7
25.3	.30960E 9	.12936E 9	.50554E 8	.20319E 8	.81443E 7
30.6	.40358E 9	.16932E 9	.67385E 8	.27357E 8	.11069E 8
37.1	.53357E 9	.22164E 9	.91517E 8	.37606E 8	.15391E 8
44.8	.71693E 9	.30286E 9	.12702E 9	.52962E 8	.21977E 8
54.2	.98099E 9	.42286E 9	.18071E 9	.76685E 8	.32353E 8
65.5	.13693E 10	.60475E 9	.26432E 9	.11456E 9	.49305E 8
79.3	.19519E 10	.88730E 9	.39844E 9	.17711E 9	.78073E 8
95.9	.28416E 10	.13370E 10	.61990E 9	.28399E 9	.12852E 9
115.6	.42184E 10	.20669E 10	.99531E 9	.47258E 9	.22176E 9
140.2	.63626E 10	.32631E 10	.16452E 10	.81468E 9	.39790E 9
169.6	.96923E 10	.52551E 10	.27446E 10	.14474E 10	.74091E 9
205.1	.14787E 11	.85189E 10	.47839E 10	.26299E 10	.14198E 10
248.1	.22362E 11	.13785E 11	.82416E 10	.48209E 10	.27641E 10
300.0	.33163E 11	.21886E 11	.14034E 11	.87799E 10	.53764E 10

Table 8H

GRAPH OF ENERGY LEVELS VS. WC

(110) n-Si

DOUBLE BAND K1A = K2A = K1B = K3B = 0.190, K3A = K2B = 0.916

DONOR CONCENTRATION = .5E 18/CUBIC CENTIMETER

TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

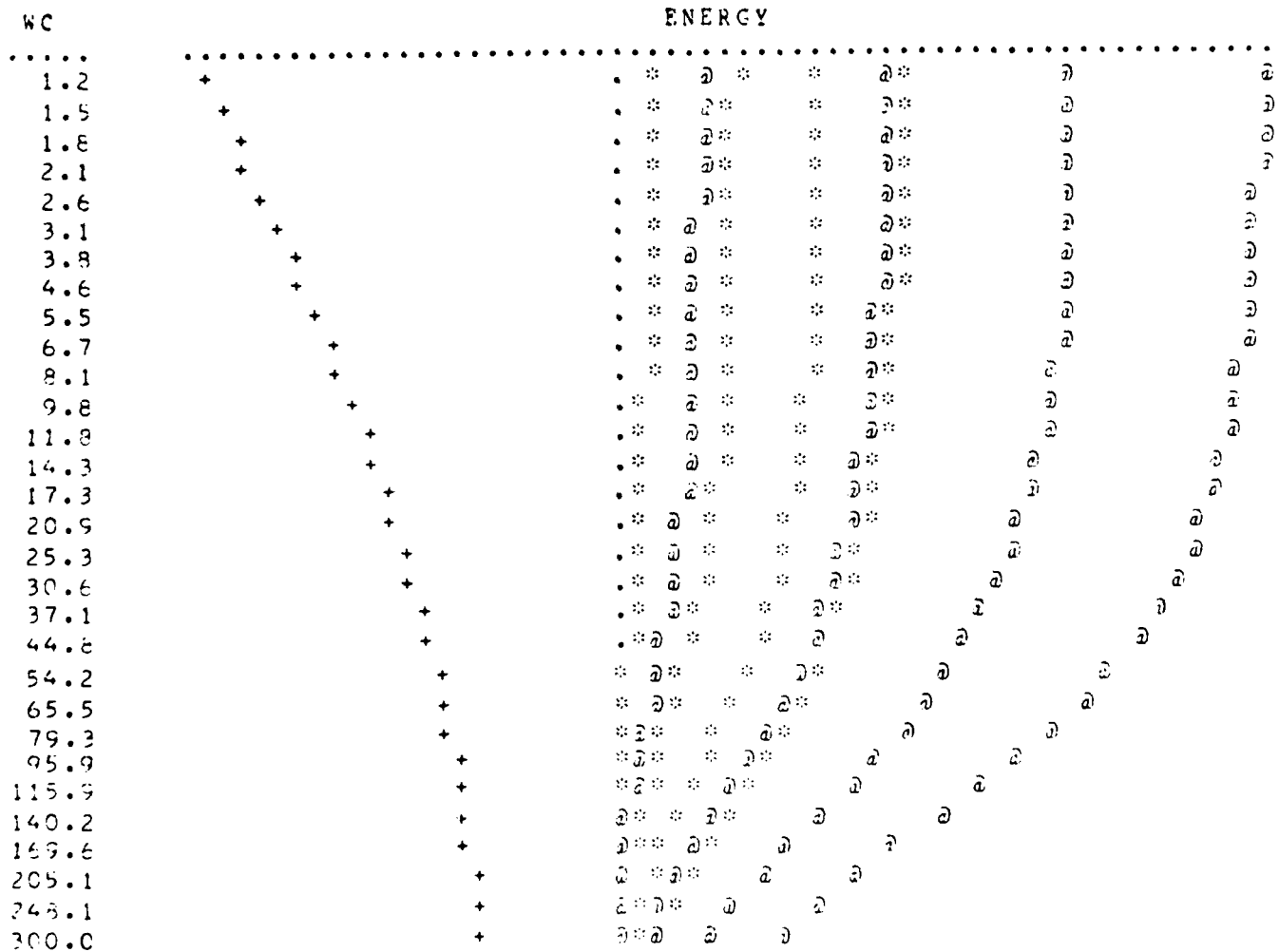


Figure 9

$w_c(\text{\AA})$	E_f	ECA(1)	ECA(2)	ECA(3)	ECA(4)	ECA(5)
1.2	-39.098	3.599	11.815	19.753	27.700	35.653
1.5	-37.865	3.879	11.781	19.709	27.648	35.593
1.8	-36.637	3.856	11.740	19.656	27.585	35.522
2.1	-35.417	3.828	11.691	19.592	27.509	35.435
2.6	-34.204	3.794	11.631	19.515	27.417	35.331
3.1	-33.002	3.754	11.560	19.422	27.307	35.206
3.8	-31.811	3.706	11.474	19.310	27.174	35.054
4.6	-30.634	3.648	11.371	19.175	27.014	34.872
5.5	-29.474	3.580	11.247	19.014	26.821	34.653
6.7	-28.334	3.499	11.100	18.821	26.591	34.390
8.1	-27.216	3.404	10.924	18.589	26.314	34.075
9.8	-26.125	3.293	10.716	18.314	25.984	33.697
11.8	-25.066	3.163	10.469	17.986	25.590	33.246
14.3	-24.041	3.013	10.178	17.597	25.122	32.709
17.3	-23.057	2.842	9.838	17.139	24.567	32.071
20.9	-22.118	2.649	9.442	16.601	23.914	31.317
25.3	-21.229	2.435	8.986	15.974	23.147	30.429
30.6	-20.392	2.201	8.465	15.249	22.254	29.390
37.1	-19.611	1.952	7.879	14.419	21.223	28.184
44.8	-18.886	1.694	7.230	13.480	20.043	26.794
54.2	-18.217	1.434	6.523	12.433	18.711	25.211
65.5	-17.600	1.183	5.772	11.286	17.228	23.431
79.3	-17.032	.949	4.995	10.056	15.607	21.462
95.9	-16.509	.741	4.218	8.773	13.875	19.325
115.9	-16.026	.563	3.468	7.472	12.072	17.060
140.2	-15.583	.418	2.774	6.201	10.253	14.727
169.6	-15.179	.304	2.158	5.007	8.482	12.399
205.1	-14.815	.218	1.637	3.933	6.827	10.164
248.1	-14.489	.154	1.213	3.008	5.346	8.104
300.0	-14.194	.108	.881	2.246	4.077	6.287

Table 9A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECA(6)	ECA(7)	ECA(8)	ECA(9)	ECA(10)
1.2	43.609	51.567	59.528	67.490	75.454
1.5	43.543	51.496	59.451	67.408	75.367
1.8	43.464	51.410	59.358	67.310	75.263
2.1	43.368	51.306	59.247	67.191	75.137
2.6	43.253	51.180	59.112	67.047	74.985
3.1	43.114	51.029	58.949	66.873	74.801
3.8	42.946	50.846	58.752	66.664	74.580
4.6	42.744	50.626	58.516	66.412	74.313
5.5	42.501	50.361	58.231	66.109	73.991
6.7	42.209	50.043	57.883	65.742	73.604
8.1	41.859	49.661	57.476	65.303	73.139
9.8	41.439	49.202	56.982	64.776	72.580
11.8	40.937	48.654	56.391	64.144	71.910
14.3	40.338	47.999	55.683	63.387	71.108
17.3	39.626	47.218	54.840	62.485	70.150
20.9	38.782	46.292	53.837	61.411	69.009
25.3	37.785	45.196	52.650	60.138	67.654
30.6	36.616	43.907	51.250	58.634	66.053
37.1	35.252	42.399	49.609	56.868	64.168
44.8	33.673	40.648	47.697	54.805	61.963
54.2	31.865	38.632	45.488	52.415	59.403
65.5	29.816	36.336	42.961	49.673	56.455
79.3	27.529	33.756	40.107	46.561	53.099
95.9	25.021	30.903	36.931	43.079	49.327
115.9	22.328	27.809	33.460	39.250	45.157
140.2	19.510	24.533	29.749	35.124	40.634
169.6	16.648	21.160	25.886	30.790	35.846
205.1	13.844	17.801	21.987	26.368	30.916
248.1	11.201	14.578	18.193	22.011	26.007
300.0	8.815	11.613	14.645	17.880	21.298

Table 9B

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECB(1)	ECB(2)	ECB(3)	ECB(4)	ECB(5)
1.2	8.627	26.059	43.523	61.000	78.485
1.5	8.598	26.008	43.457	60.922	78.397
1.8	8.563	25.947	43.378	60.829	78.290
2.1	8.521	25.874	43.283	60.715	78.162
2.6	8.471	25.785	43.167	60.579	78.007
3.1	8.410	25.677	43.028	60.414	77.819
3.8	8.337	25.548	42.861	60.215	77.593
4.6	8.249	25.393	42.659	59.975	77.321
5.5	8.145	25.207	42.416	59.687	76.993
6.7	8.020	24.984	42.125	59.340	76.598
8.1	7.872	24.716	41.775	58.923	76.123
9.8	7.697	24.396	41.356	58.422	75.553
11.8	7.490	24.015	40.854	57.823	74.869
14.3	7.248	23.562	40.256	57.107	74.050
17.3	6.966	23.026	39.544	56.252	73.072
20.9	6.640	22.395	38.701	55.236	71.906
25.3	6.268	21.656	37.706	54.032	70.522
30.6	5.847	20.795	36.538	52.613	68.884
37.1	5.380	19.803	35.175	50.947	66.956
44.2	4.870	18.670	33.599	49.007	64.699
54.2	4.325	17.393	31.792	46.764	62.076
65.5	3.759	15.976	29.746	44.196	59.053
79.3	3.188	14.432	27.463	41.294	55.607
95.9	2.634	12.789	24.959	38.057	51.723
115.9	2.117	11.086	22.270	34.520	47.432
140.2	1.656	9.377	19.457	30.732	42.763
169.6	1.261	7.724	16.601	26.780	37.806
205.1	.938	6.189	13.802	22.764	32.687
248.1	.684	4.825	11.166	18.884	27.570
300.0	.490	3.665	8.786	15.228	22.642

Table 9C

ENERGY IN MILLI-ELECTRON VOLTS
 ÅC IN ÅNGSTRÖMS

WC	ECB(6)	ECB(7)	ECB(8)	FCB(9)	ECB(10)
1.2	95.975	113.470	130.967	148.466	165.968
1.5	95.878	113.363	130.853	148.345	165.840
1.8	95.760	113.235	130.715	148.198	165.685
2.1	95.618	113.081	130.549	148.021	165.497
2.6	95.446	112.894	130.348	147.807	165.271
3.1	95.239	112.668	130.105	147.549	164.998
3.8	94.989	112.396	129.813	147.237	164.663
4.6	94.687	112.069	129.460	146.861	164.270
5.5	94.323	111.672	129.034	146.407	163.790
6.7	93.886	111.195	128.521	145.861	163.211
8.1	93.359	110.621	127.903	145.202	162.514
9.8	92.726	109.931	127.160	144.409	161.675
11.8	91.966	109.102	126.267	143.457	160.666
14.3	91.056	108.108	125.196	142.313	159.454
17.3	89.967	106.918	123.913	140.942	158.001
20.9	88.668	105.497	122.378	139.302	156.261
25.3	87.122	103.804	120.549	137.345	154.183
30.6	85.289	101.793	118.373	135.015	151.705
37.1	83.126	99.415	115.796	132.251	148.768
44.9	80.586	96.615	112.756	128.986	145.291
54.2	77.621	93.338	109.190	125.149	141.198
65.5	74.189	89.531	105.034	120.667	136.407
79.3	70.253	85.145	100.230	115.471	130.841
95.9	65.791	80.147	94.732	109.503	124.429
115.9	60.805	74.524	88.515	102.726	117.122
140.2	55.329	68.299	81.587	95.136	108.902
169.6	49.440	61.538	74.006	86.777	99.802
205.1	43.266	54.367	65.889	77.758	89.920
248.1	36.983	46.969	57.422	68.265	79.438
300.0	30.809	39.582	48.859	58.559	68.625

Table 9D

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NA1	NA2	NA3	NA4	NA5
1.2	.80503E 9	.24419E 9	.73798E 8	.22270E 8	.67152E 7
1.5	.97220E 9	.29557E 9	.89467E 8	.27033E 8	.81598E 7
1.8	.11737E 10	.35784E 9	.10852E 9	.32838E 8	.99250E 7
2.1	.14165E 10	.43332E 9	.13171E 9	.39927E 8	.12087E 8
2.6	.17088E 10	.52486E 9	.15997E 9	.48601E 8	.14740E 8
3.1	.20602E 10	.63593E 9	.19446E 9	.59239E 8	.18008E 8
3.8	.24823E 10	.77080E 9	.23665E 9	.72323E 8	.22046E 8
4.6	.29884E 10	.93469E 9	.28836E 9	.88470E 8	.27058E 8
5.5	.35943E 10	.11340E 10	.35191E 9	.10848E 9	.33311E 8
6.7	.43180E 10	.13767E 10	.43027E 9	.13339E 9	.41161E 8
8.1	.51801E 10	.16726E 10	.52724E 9	.16458E 9	.51087E 8
9.8	.62035E 10	.20339E 10	.64779E 9	.20383E 9	.63745E 8
11.8	.74135E 10	.24757E 10	.79842E 9	.25384E 9	.80048E 8
14.3	.88370E 10	.30170E 10	.98777E 9	.31787E 9	.10129E 9
17.3	.10501E 11	.36815E 10	.12274E 10	.40022E 9	.12935E 9
20.9	.12433E 11	.44986E 10	.15331E 10	.50955E 9	.16696E 9
25.3	.14653E 11	.55054E 10	.19262E 10	.65400E 9	.21826E 9
30.6	.17178E 11	.67474E 10	.24363E 10	.84868E 9	.28956E 9
37.1	.20010E 11	.82798E 10	.31043E 10	.11151E 10	.39071E 9
44.8	.23137E 11	.10168E 11	.39861E 10	.14854E 10	.53732E 9
54.2	.26528E 11	.12484E 11	.51577E 10	.20077E 10	.75442E 9
65.5	.30133E 11	.15302E 11	.67185E 10	.27533E 10	.10824E 10
79.3	.33883E 11	.18679E 11	.87920E 10	.38256E 10	.15859E 10
95.9	.37696E 11	.22641E 11	.11516E 11	.53672E 10	.23667E 10
115.9	.41489E 11	.27147E 11	.15017E 11	.75594E 10	.35770E 10
140.2	.45175E 11	.32073E 11	.19365E 11	.10601E 11	.54273E 10
169.6	.48676E 11	.37215E 11	.24518E 11	.14657E 11	.81710E 10
205.1	.51935E 11	.42325E 11	.30289E 11	.19776E 11	.12047E 11
245.1	.54925E 11	.47176E 11	.36365E 11	.25824E 11	.17179E 11
300.0	.57665E 11	.51623E 11	.42399E 11	.32479E 11	.23475E 11

Table 9E

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NA6		NA7		NA8		NA9		NA10	
1.2	.20237E	7	.60966E	6	.18363E	6	.55330E	5	.16696E	5
1.5	.24614E	7	.74210E	6	.22372E	6	.67442E	5	.20359E	5
1.8	.29973E	7	.90469E	6	.27297E	6	.82359E	5	.24870E	5
2.1	.36552E	7	.11047E	7	.33369E	6	.10078E	6	.30455E	5
2.6	.44652E	7	.13515E	7	.40883E	6	.12363E	6	.37396E	5
3.1	.54661E	7	.16575E	7	.50225E	6	.15212E	6	.46075E	5
3.8	.67084E	7	.20388E	7	.61906E	6	.18755E	6	.56992E	5
4.6	.82582E	7	.25166E	7	.76606E	6	.23299E	6	.70837E	5
5.5	.10203E	8	.31197E	7	.95251E	6	.29052E	6	.88555E	5
6.7	.12663E	8	.38871E	7	.11912E	7	.36456E	6	.11148E	6
8.1	.15800E	8	.48733E	7	.15001E	7	.46100E	6	.14151E	6
9.8	.19840E	8	.61554E	7	.19049E	7	.58835E	6	.18144E	6
11.8	.25108E	8	.78443E	7	.24434E	7	.75927E	6	.23549E	6
14.3	.32068E	8	.10105E	8	.31723E	7	.99303E	6	.31012E	6
17.3	.41413E	8	.13184E	8	.41785E	7	.13197E	7	.41558E	6
20.9	.54187E	8	.17465E	8	.55993E	7	.17375E	7	.56862E	6
25.3	.72007E	8	.23559E	8	.76583E	7	.24766E	7	.79753E	6
30.6	.97437E	8	.32459E	8	.10729E	8	.35245E	7	.11518E	7
37.1	.13464E	9	.45838E	8	.15460E	8	.51751E	7	.17216E	7
44.8	.19052E	9	.66580E	8	.23006E	8	.78781E	7	.26776E	7
54.2	.27690E	9	.99807E	8	.35505E	8	.12494E	8	.43572E	7
65.5	.41363E	9	.15482E	9	.57023E	8	.20732E	8	.74568E	7
79.3	.63595E	9	.24883E	9	.95519E	8	.36106E	8	.13474E	8
95.9	.10041E	10	.41392E	9	.16685E	9	.66040E	8	.25747E	8
115.9	.16197E	10	.70950E	9	.30279E	9	.12651E	9	.51925E	8
140.2	.26458E	10	.12424E	10	.56625E	9	.25187E	9	.10976E	9
169.6	.43216E	10	.21934E	10	.10769E	10	.51442E	9	.24009E	9
205.1	.69510E	10	.38393E	10	.20458E	10	.10579E	10	.53316E	9
244.1	.10836E	11	.65389E	10	.38017E	10	.21413E	10	.11734E	10
300.0	.16148E	11	.10647E	11	.67661E	10	.41643E	10	.24917E	10

Table 9F

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NE1	NE2	NE3	NE4	NE5
1.2	.86686E 9	.62627E 8	.45013E 7	.32298E 6	.23255E 5
1.5	.10485E 10	.76001E 8	.54748E 7	.39352E 6	.28350E 5
1.8	.12682E 10	.92296E 8	.66667E 7	.48023E 6	.34643E 5
2.1	.15339E 10	.11218E 9	.81298E 7	.58716E 6	.42426E 5
2.6	.18554E 10	.13649E 9	.99312E 7	.71957E 6	.52120E 5
3.1	.22442E 10	.16629E 9	.12157E 8	.88426E 6	.64231E 5
3.6	.27147E 10	.20289E 9	.14920E 8	.10903E 7	.79485E 5
4.6	.32839E 10	.24800E 9	.18366E 8	.13498E 7	.95860E 5
5.5	.39725E 10	.30360E 9	.22691E 8	.16792E 7	.12371E 6
6.7	.48055E 10	.37316E 9	.28160E 8	.21014E 7	.15590E 6
8.1	.58132E 10	.45980E 9	.35133E 8	.26484E 7	.19817E 6
9.8	.70322E 10	.56873E 9	.44116E 8	.33663E 7	.25453E 6
11.8	.85062E 10	.70668E 9	.55823E 8	.43229E 7	.33103E 6
14.3	.10288E 11	.88287E 9	.71292E 8	.56203E 7	.43703E 6
17.3	.12440E 11	.11101E 10	.92056E 8	.74154E 7	.58744E 6
20.9	.15037E 11	.14065E 10	.12043E 9	.99572E 7	.80674E 6
25.3	.18163E 11	.17978E 10	.16001E 9	.13652E 8	.11366E 7
30.6	.21918E 11	.23214E 10	.21648E 9	.19164E 8	.16504E 7
37.1	.26406E 11	.30321E 10	.29906E 9	.27741E 8	.24829E 7
44.8	.31736E 11	.40104E 10	.42307E 9	.41460E 8	.38921E 7
54.2	.38007E 11	.53746E 10	.61444E 9	.64315E 8	.63930E 7
65.5	.45282E 11	.72973E 10	.91777E 9	.10394E 9	.11067E 8
79.3	.53565E 11	.10021E 11	.14104E 10	.17539E 9	.20270E 8
95.9	.62761E 11	.13870E 11	.22255E 10	.30903E 9	.39362E 8
115.9	.72653E 11	.19237E 11	.35875E 10	.56659E 9	.80906E 8
140.2	.82900E 11	.26526E 11	.58557E 10	.10722E 10	.17486E 9
169.6	.93086E 11	.36019E 11	.95564E 10	.20666E 10	.39232E 9
205.1	.10281E 12	.47715E 11	.15357E 11	.39847E 10	.89653E 9
248.1	.11174E 12	.61208E 11	.23916E 11	.75237E 10	.20360E 10
300.0	.11988E 12	.75733E 11	.35608E 11	.13612E 11	.44695E 10

Table 9G

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NB6		NB7		NB8		NB9		NB10	
1.2	.17722E	4	.24193E	3	.13991E	3	.12534E	3	.12534E	3
1.5	.21424E	4	.27982E	3	.13991E	3	.12534E	3	.12534E	3
1.8	.25942E	4	.30897E	3	.13991E	3	.12534E	3	.12534E	3
2.1	.31684E	4	.34395E	3	.13991E	3	.12534E	3	.12534E	3
2.6	.38738E	4	.39642E	3	.13991E	3	.12534E	3	.12534E	3
3.1	.47687E	4	.46054E	3	.13991E	3	.12534E	3	.12534E	3
3.6	.58938E	4	.54508E	3	.15740E	3	.12534E	3	.12534E	3
4.6	.73221E	4	.64709E	3	.15740E	3	.12534E	3	.12534E	3
5.5	.91905E	4	.78118E	3	.17198E	3	.12534E	3	.12534E	3
6.7	.11613E	5	.96773E	3	.19238E	3	.12534E	3	.12534E	3
8.1	.14857E	5	.12184E	4	.20987E	3	.12534E	3	.12534E	3
9.8	.19235E	5	.15565E	4	.22736E	3	.12534E	3	.12534E	3
11.8	.25257E	5	.20258E	4	.25942E	3	.13991E	3	.12534E	3
14.3	.33766E	5	.26991E	4	.32646E	3	.13991E	3	.12534E	3
17.3	.46116E	5	.36931E	4	.39642E	3	.13991E	3	.12534E	3
20.9	.64564E	5	.52205E	4	.53050E	3	.15740E	3	.12534E	3
25.3	.93158E	5	.76427E	4	.72871E	3	.17198E	3	.12534E	3
30.6	.13925E	6	.11683E	5	.10668E	4	.20987E	3	.12534E	3
37.1	.21700E	6	.16728E	5	.17081E	4	.25942E	3	.13991E	3
44.8	.35495E	6	.31781E	5	.28974E	4	.35853E	3	.13991E	3
54.2	.61379E	6	.57519E	5	.53895E	4	.59463E	3	.17198E	3
65.5	.11300E	7	.11193E	6	.10925E	5	.11484E	4	.22736E	3
79.3	.22282E	7	.23609E	6	.24400E	5	.25621E	4	.35853E	3
95.9	.47244E	7	.54262E	6	.60291E	5	.66167E	4	.81616E	3
115.9	.10775E	8	.13620E	7	.16536E	6	.19518E	5	.23464E	4
140.2	.26300E	8	.37220E	7	.50211E	6	.65222E	5	.82986E	4
169.6	.67912E	8	.10960E	8	.16731E	7	.24408E	6	.34354E	5
205.1	.18199E	9	.34134E	8	.60091E	7	.10040E	7	.16058E	6
248.1	.49287E	9	.10938E	9	.22623E	8	.44123E	7	.61867E	6
300.0	.13065E	10	.34920E	9	.86003E	8	.19923E	8	.43682E	7

Table 9H

GRAPH OF ENERGY LEVELS VS. WC

(110) n-Si

DOUBLE BAND K1A = K2A = K1B = K3B = 0.190, K3A = K2B = 0.916

DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

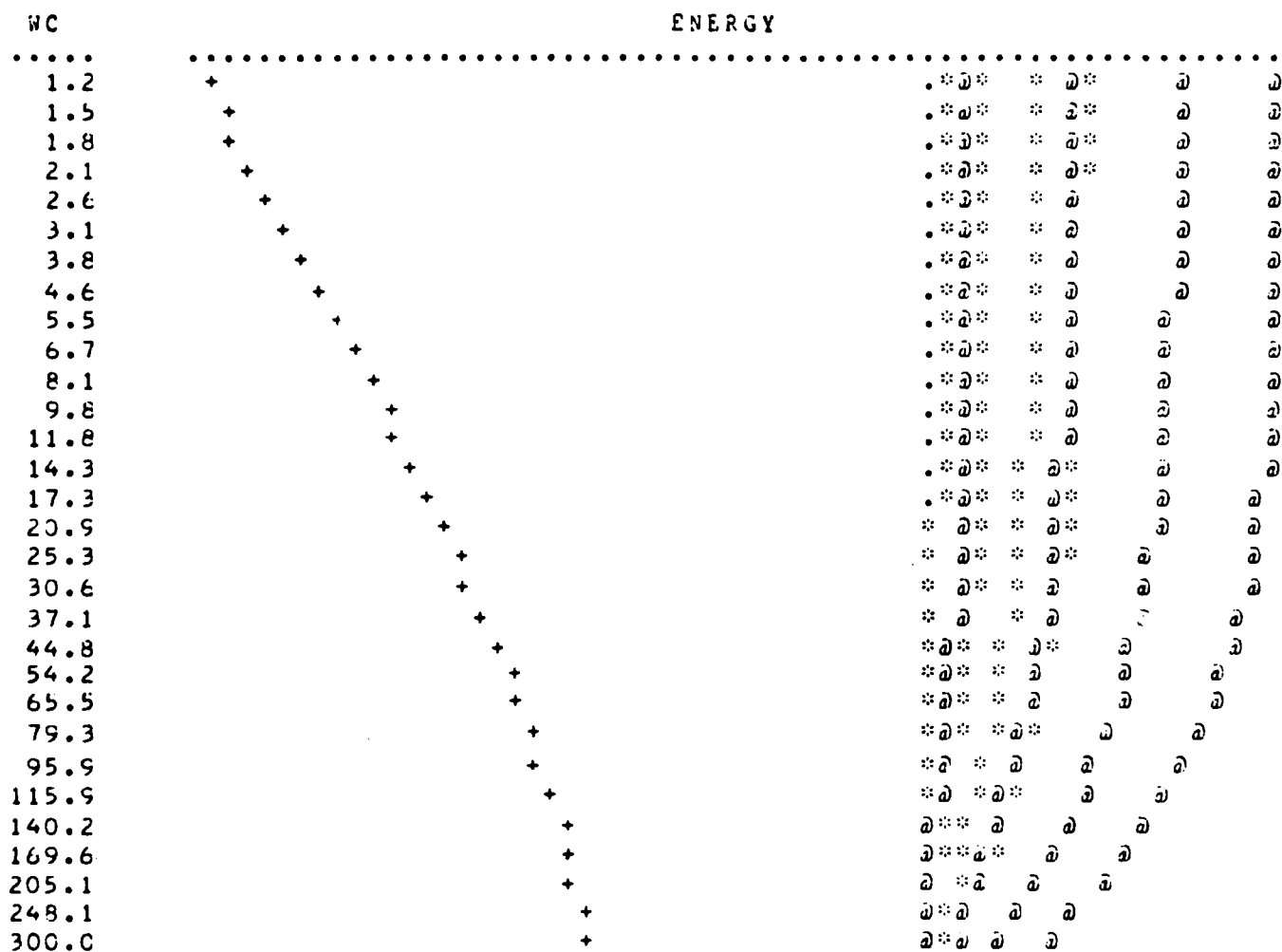


Figure 10

$W_c(\text{\AA})$	E_f	ECA(1)	ECA(2)	ECA(3)	ECA(4)	ECA(5)
1.2	-56.055	1.757	5.308	8.865	12.425	15.986
1.5	-54.805	1.752	5.298	8.852	12.409	15.969
1.8	-53.557	1.745	5.286	8.836	12.390	15.947
2.1	-52.312	1.736	5.271	8.817	12.368	15.921
2.6	-51.070	1.726	5.253	8.793	12.340	15.890
3.1	-49.832	1.714	5.231	8.765	12.307	15.852
3.8	-48.599	1.699	5.205	8.732	12.267	15.806
4.6	-47.371	1.681	5.174	8.691	12.218	15.751
5.5	-46.150	1.660	5.136	8.642	12.160	15.685
6.7	-44.938	1.635	5.091	8.583	12.090	15.606
8.1	-43.735	1.605	5.037	8.512	12.006	15.510
9.8	-42.544	1.570	4.972	8.428	11.905	15.394
11.8	-41.366	1.528	4.895	8.326	11.784	15.256
14.3	-40.205	1.479	4.804	8.206	11.639	15.091
17.3	-39.062	1.422	4.696	8.062	11.466	14.893
20.9	-37.942	1.356	4.568	7.891	11.261	14.658
25.3	-36.847	1.280	4.419	7.690	11.018	14.378
30.6	-35.781	1.195	4.245	7.454	10.731	14.047
37.1	-34.749	1.101	4.044	7.179	10.394	13.658
44.8	-33.753	.997	3.814	6.860	10.002	13.201
54.2	-32.799	.886	3.556	6.494	9.548	12.671
65.5	-31.890	.771	3.268	6.080	9.028	12.059
79.3	-31.029	.655	2.955	5.617	8.440	11.362
95.9	-30.218	.542	2.621	5.109	7.785	10.576
115.9	-29.456	.436	2.275	4.563	7.067	9.705
140.2	-28.751	.341	1.926	3.991	6.297	8.757
169.6	-28.097	.260	1.589	3.409	5.493	7.750
205.1	-27.493	.194	1.275	2.838	4.679	6.708
248.1	-26.937	.141	.995	2.299	3.883	5.665
300.0	-26.425	.101	.757	1.811	3.136	4.658

Table 10A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECA(6)	ECA(7)	ECA(8)	ECA(9)	ECA(10)
1.2	19.549	23.112	26.676	30.240	33.805
1.5	19.529	23.091	26.653	30.216	33.779
1.8	19.505	23.065	26.625	30.186	33.748
2.1	19.477	23.034	26.592	30.151	33.710
2.6	19.442	22.996	26.551	30.107	33.665
3.1	19.400	22.950	26.502	30.055	33.609
3.8	19.350	22.895	26.443	29.992	33.543
4.6	19.289	22.829	26.372	29.916	33.462
5.5	19.215	22.749	26.286	29.825	33.366
6.7	19.127	22.653	26.182	29.714	33.249
8.1	19.021	22.537	26.058	29.581	33.108
9.8	18.893	22.398	25.908	29.421	32.939
11.3	18.740	22.230	25.727	29.229	32.735
14.3	18.556	22.030	25.511	28.998	32.490
17.3	18.336	21.789	25.252	28.721	32.197
20.9	18.073	21.502	24.942	28.390	31.845
25.3	17.761	21.160	24.572	27.995	31.426
30.6	17.391	20.754	24.133	27.524	30.926
37.1	16.954	20.274	23.612	26.966	30.332
44.8	16.440	19.708	22.998	26.306	29.629
54.2	15.841	19.045	22.277	25.530	28.802
65.5	15.146	18.275	21.437	24.624	27.833
79.3	14.350	17.388	20.465	23.573	26.708
95.9	13.440	16.376	19.352	22.365	25.410
115.9	12.436	15.237	18.092	20.993	23.931
140.2	11.325	13.974	16.688	19.455	22.265
169.6	10.129	12.602	15.150	17.759	20.420
205.1	8.873	11.145	13.501	15.929	18.414
248.1	7.594	9.639	11.779	13.998	16.284
300.0	6.334	8.133	10.035	12.022	14.084

Table 10B

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECB(1)	ECB(2)	ECB(3)	ECB(4)	ECB(5)
1.2	3.8 9	11.690	19.511	27.335	35.162
1.5	3.870	11.675	19.491	27.312	35.136
1.8	3.860	11.656	19.467	27.284	35.104
2.1	3.847	11.634	19.438	27.250	35.065
2.6	3.832	11.607	19.404	27.209	35.019
3.1	3.813	11.575	19.362	27.159	34.962
3.8	3.791	11.536	19.312	27.099	34.894
4.6	3.764	11.489	19.251	27.027	34.812
5.5	3.732	11.433	19.177	26.940	34.714
6.7	3.694	11.365	19.089	26.835	34.594
8.1	3.648	11.283	18.983	26.709	34.451
9.8	3.594	11.186	18.855	26.557	34.278
11.8	3.529	11.068	18.702	26.375	34.070
14.3	3.452	10.926	18.518	26.155	33.820
17.3	3.361	10.761	18.299	25.893	33.521
20.9	3.255	10.563	18.037	25.579	33.162
25.3	3.131	10.328	17.725	25.205	32.733
30.6	2.987	10.051	17.355	24.759	32.223
37.1	2.823	9.726	16.918	24.231	31.616
44.8	2.638	9.348	16.405	23.608	30.897
54.2	2.431	8.911	15.806	22.877	30.051
65.5	2.205	8.412	15.113	22.024	29.060
79.3	1.963	7.848	14.317	21.037	27.907
95.9	1.711	7.221	13.415	19.906	26.576
115.9	1.455	6.537	12.406	18.626	25.057
140.2	1.206	5.806	11.297	17.196	23.345
169.6	.973	5.047	10.103	15.628	21.445
205.1	.763	4.282	8.849	13.945	19.374
248.1	.583	3.538	7.572	12.184	17.170
300.0	.435	2.844	6.315	10.396	14.886

Table 10C

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	ECB(6)	ECB(7)	ECB(8)	ECB(9)	ECB(10)
1.2	42.991	50.820	58.651	66.482	74.314
1.5	42.961	50.788	58.617	66.446	74.276
1.8	42.926	50.750	58.575	66.402	74.229
2.1	42.893	50.704	58.526	66.349	74.173
2.6	42.832	50.648	58.465	66.285	74.105
3.1	42.770	50.580	58.393	66.207	74.023
3.8	42.694	50.498	58.305	66.114	73.924
4.6	42.604	50.399	58.199	66.001	73.805
5.5	42.494	50.280	58.071	65.864	73.660
6.7	42.362	50.137	57.916	65.699	73.486
8.1	42.203	49.963	57.730	65.501	73.276
9.8	42.012	49.755	57.505	65.262	73.023
11.8	41.781	49.504	57.235	64.973	72.718
14.3	41.504	49.201	56.910	64.626	72.351
17.3	41.171	48.839	56.519	64.209	71.909
20.9	40.773	48.403	56.050	63.709	71.378
25.3	40.296	47.882	55.488	63.108	70.742
30.6	39.726	47.259	54.815	62.390	69.980
37.1	39.049	46.517	54.014	61.532	69.069
44.8	38.245	45.636	53.060	60.511	67.984
54.2	37.296	44.592	51.929	59.299	66.696
65.5	36.180	43.364	50.595	57.867	65.170
79.3	34.878	41.924	49.030	56.182	63.374
95.9	33.368	40.250	47.203	54.213	61.270
115.9	31.635	38.320	45.090	51.926	58.822
140.2	29.667	36.117	42.668	49.300	56.000
169.6	27.464	33.635	39.925	46.312	52.779
205.1	25.039	30.881	36.863	42.959	49.151
248.1	22.424	27.883	33.504	39.259	45.125
300.0	19.674	24.694	29.899	35.256	40.743

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NA1		NA2		NA3		NA4		NA5	
1.2	.86310E	8	.50536E	8	.29560E	8	.17283E	8	.10103E	8
1.5	.10430E	9	.61110E	8	.35762E	8	.20917E	8	.12231E	8
1.8	.12602E	9	.73897E	8	.43268E	8	.25319E	8	.14811E	8
2.1	.15224E	9	.89354E	8	.52354E	8	.30652E	8	.17939E	8
2.6	.18386E	9	.10804E	9	.63355E	8	.37118E	8	.21735E	8
3.1	.22199E	9	.13063E	9	.76677E	8	.44958E	8	.26344E	8
3.8	.26792E	9	.15794E	9	.92813E	8	.54472E	8	.31945E	8
4.6	.32324E	9	.19094E	9	.11237E	9	.66026E	8	.38760E	8
5.5	.38977E	9	.23082E	9	.13607E	9	.80066E	8	.47059E	8
6.7	.46969E	9	.27899E	9	.16482E	9	.97144E	8	.57180E	8
8.1	.56556E	9	.33718E	9	.19970E	9	.11794E	9	.69546E	8
9.8	.68039E	9	.40744E	9	.24205E	9	.14331E	9	.84625E	8
11.8	.81760E	9	.49224E	9	.29350E	9	.17430E	9	.10326E	9
14.3	.98113E	9	.59452E	9	.35608E	9	.21223E	9	.12613E	9
17.3	.11754E	10	.71782E	9	.43225E	9	.25876E	9	.15436E	9
20.9	.14053E	10	.86631E	9	.52507E	9	.31599E	9	.18937E	9
25.3	.16761E	10	.10449E	10	.63830E	9	.38660E	9	.23297E	9
30.6	.19930E	10	.12594E	10	.77662E	9	.47400E	9	.28755E	9
37.1	.23613E	10	.15163E	10	.94574E	9	.58261E	9	.35628E	9
44.8	.27856E	10	.18232E	10	.11527E	10	.71808E	9	.44339E	9
54.2	.32691E	10	.21882E	10	.14061E	10	.88772E	9	.55456E	9
65.5	.38131E	10	.26197E	10	.17161E	10	.11009E	10	.69737E	9
79.3	.44160E	10	.31258E	10	.20946E	10	.13694E	10	.88200E	9
95.9	.50731E	10	.37127E	10	.25544E	10	.17077E	10	.11218E	10
115.9	.57760E	10	.43835E	10	.31083E	10	.21329E	10	.14340E	10
140.2	.65135E	10	.51357E	10	.37671E	10	.26634E	10	.18396E	10
169.6	.72724E	10	.59598E	10	.45357E	10	.33165E	10	.23624E	10
205.1	.80400E	10	.68387E	10	.54103E	10	.41039E	10	.30257E	10
248.1	.88057E	10	.77495E	10	.63753E	10	.50271E	10	.38475E	10
300.0	.95630E	10	.86707E	10	.74050E	10	.60724E	10	.48327E	10

Table 10E

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NA6		NA7		NA8		NA9		NA10	
1.2	.59047E	7	.34506E	7	.20163E	7	.11781E	7	.68834E	6
1.5	.71505E	7	.41797E	7	.24429E	7	.14277E	7	.83433E	6
1.8	.86617E	7	.50646E	7	.29610E	7	.17309E	7	.10118E	7
2.1	.10495E	8	.61392E	7	.35905E	7	.20996E	7	.12277E	7
2.6	.12723E	8	.74455E	7	.43563E	7	.25485E	7	.14907E	7
3.1	.15430E	8	.90350E	7	.52890E	7	.30956E	7	.18115E	7
3.8	.18725E	8	.10971E	8	.64266E	7	.37636E	7	.22036E	7
4.6	.22739E	8	.13335E	8	.78168E	7	.45809E	7	.26840E	7
5.5	.27638E	8	.16223E	8	.95187E	7	.55831E	7	.32739E	7
6.7	.33626E	8	.19762E	8	.11608E	8	.68153E	7	.40002E	7
8.1	.40963E	8	.24108E	8	.14180E	8	.83358E	7	.48983E	7
9.8	.49976E	8	.29464E	8	.17357E	8	.10219E	8	.60137E	7
11.8	.61081E	8	.36087E	8	.21301E	8	.12564E	8	.74060E	7
14.3	.74814E	8	.44313E	8	.26218E	8	.15498E	8	.91548E	7
17.3	.91872E	8	.54584E	8	.32387E	8	.19196E	8	.11368E	8
20.9	.11317E	9	.67487E	8	.40181E	8	.23892E	8	.14192E	8
25.3	.13991E	9	.83810E	8	.50108E	8	.29911E	8	.17832E	8
30.6	.17372E	9	.10463E	9	.62871E	8	.37707E	8	.22580E	8
37.1	.21679E	9	.13144E	9	.79458E	8	.47927E	8	.28853E	8
44.8	.27215E	9	.16630E	9	.10128E	9	.61507E	8	.37269E	8
54.2	.34394E	9	.21219E	9	.13037E	9	.79830E	8	.48750E	8
65.5	.43796E	9	.27330E	9	.16971E	9	.10496E	9	.64701E	8
79.3	.56227E	9	.35573E	9	.22372E	9	.14003E	9	.87300E	9
95.9	.72804E	9	.46821E	9	.29899E	9	.18984E	9	.11997E	9
115.9	.95049E	9	.62329E	9	.40531E	9	.26178E	9	.16812E	9
140.2	.12498E	10	.83857E	9	.55713E	9	.36719E	9	.24040E	9
169.6	.16514E	10	.11380E	10	.77526E	9	.52325E	9	.35041E	9
205.1	.21847E	10	.15521E	10	.10885E	10	.75519E	9	.51924E	9
248.1	.28792E	10	.21167E	10	.15338E	10	.10982E	10	.77826E	9
300.0	.37576E	10	.28673E	10	.21542E	10	.15973E	10	.11711E	10

Table 10F

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NB1		NB2		NB3		NB4		NB5	
1.2	.13764E	9	.42397E	8	.13040E	8	.40085E	7	.12318E	7
1.5	.16640E	9	.51307E	8	.15791E	8	.48568E	7	.14932E	7
1.8	.20116E	9	.62099E	8	.19129E	8	.58871E	7	.18109E	7
2.1	.24316E	9	.75172E	8	.23173E	8	.71391E	7	.21976E	7
2.6	.29390E	9	.91016E	8	.28097E	8	.86625E	7	.26687E	7
3.1	.35518E	9	.11022E	9	.34076E	8	.10518E	8	.32436E	7
3.8	.42916E	9	.13352E	9	.41351E	8	.12782E	8	.39466E	7
4.6	.51847E	9	.16181E	9	.50217E	8	.15549E	8	.48079E	7
5.5	.62622E	9	.19616E	9	.61034E	8	.18937E	8	.58662E	7
6.7	.75613E	9	.23793E	9	.74257E	8	.23098E	8	.71704E	7
8.1	.91269E	9	.28876E	9	.90457E	8	.28222E	8	.87842E	7
9.8	.11012E	10	.35069E	9	.11035E	9	.34557E	8	.10790E	8
11.8	.13279E	10	.42628E	9	.13488E	9	.42422E	8	.13296E	8
14.3	.16003E	10	.51867E	9	.16520E	9	.52237E	8	.16449E	8
17.3	.19271E	10	.63186E	9	.20286E	9	.64561E	8	.20443E	8
20.9	.23182E	10	.77082E	9	.24986E	9	.80147E	8	.25550E	8
25.3	.27953E	10	.94190E	9	.30889E	9	.10002E	9	.32148E	8
30.6	.33414E	10	.11531E	10	.38352E	9	.12561E	9	.40773E	8
37.1	.40008E	10	.14148E	10	.47858E	9	.15892E	9	.52204E	8
44.8	.47786E	10	.17400E	10	.60072E	9	.20282E	9	.67590E	8
54.2	.56901E	10	.21455E	10	.75912E	9	.26149E	9	.88665E	8
65.5	.67492E	10	.26525E	10	.96650E	9	.34104E	9	.11808E	9
79.3	.79666E	10	.32872E	10	.12406E	10	.45061E	9	.15999E	9
95.9	.93467E	10	.40816E	10	.16061E	10	.60384E	9	.22095E	9
115.9	.10884E	11	.50718E	10	.20964E	10	.82122E	9	.31149E	9
140.2	.12563E	11	.62960E	10	.27559E	10	.11332E	10	.44855E	9
169.6	.14352E	11	.77874E	10	.36403E	10	.15839E	10	.65930E	9
205.1	.16212E	11	.95654E	10	.48142E	10	.22354E	10	.98653E	9
248.1	.18099E	11	.11625E	11	.63422E	10	.31688E	10	.14953E	10
300.0	.19977E	11	.13929E	11	.82735E	10	.44796E	10	.22787E	10

Table 10G

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	NB6		NB7		NB8		NB9		NB10	
1.2	.37850E	6	.11634E	6	.35820E	5	.11091E	5	.34891E	4
1.5	.45898E	6	.14112E	6	.43437E	5	.13429E	5	.42119E	4
1.8	.55693E	6	.17129E	6	.52738E	5	.16288E	5	.50864E	4
2.1	.67624E	6	.20808E	6	.64077E	5	.19789E	5	.61620E	4
2.6	.82181E	6	.25303E	6	.77940E	5	.24059E	5	.74941E	4
3.1	.99974E	6	.30805E	6	.94945E	5	.29309E	5	.91099E	4
3.8	.12177E	7	.37557E	6	.11585E	6	.35786E	5	.11108E	5
4.6	.14854E	7	.45868E	6	.14162E	6	.43758E	5	.13580E	5
5.5	.18152E	7	.56132E	6	.17351E	6	.53686E	5	.16661E	5
6.7	.22231E	7	.68862E	6	.21321E	6	.66027E	5	.20494E	5
8.1	.27298E	7	.84736E	6	.26285E	6	.81540E	5	.25339E	5
9.8	.33625E	7	.10465E	7	.32536E	6	.10113E	6	.31460E	5
11.2	.41578E	7	.12970E	7	.40472E	6	.12611E	6	.39318E	5
14.3	.51648E	7	.16134E	7	.50637E	6	.15827E	6	.49477E	5
17.3	.64512E	7	.20307E	7	.63902E	6	.20021E	6	.62800E	5
20.9	.81116E	7	.25674E	7	.81077E	6	.25560E	6	.80511E	5
25.3	.10281E	8	.32755E	7	.10408E	7	.33000E	6	.10448E	6
30.6	.13155E	8	.42253E	7	.13525E	7	.43180E	6	.13760E	6
37.1	.17023E	8	.55212E	7	.17633E	7	.57414E	6	.18438E	6
44.8	.22326E	8	.73267E	7	.23924E	7	.77806E	6	.25225E	6
54.2	.29745E	8	.99010E	7	.32757E	7	.10785E	7	.35368E	6
65.5	.40363E	8	.13667E	8	.45937E	7	.15350E	7	.51047E	6
79.3	.55932E	8	.19333E	8	.66236E	7	.22532E	7	.76203E	6
95.9	.79363E	8	.28120E	8	.98579E	7	.34264E	7	.11826E	7
115.9	.11557E	9	.42181E	8	.15201E	8	.54221E	7	.19176E	7
140.2	.17296E	9	.65411E	8	.24364E	8	.89639E	7	.32646E	7
169.6	.26611E	9	.10497E	9	.40664E	8	.15525E	8	.58554E	7
205.1	.42008E	9	.17413E	9	.70669E	8	.28190E	8	.11084E	8
249.1	.67743E	9	.29752E	9	.12750E	9	.53548E	8	.22113E	8
300.0	.11076E	10	.51979E	9	.23719E	9	.10576E	9	.46247E	8

Table 10H

GRAPH OF ENERGY LEVELS VS. WC

NINP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

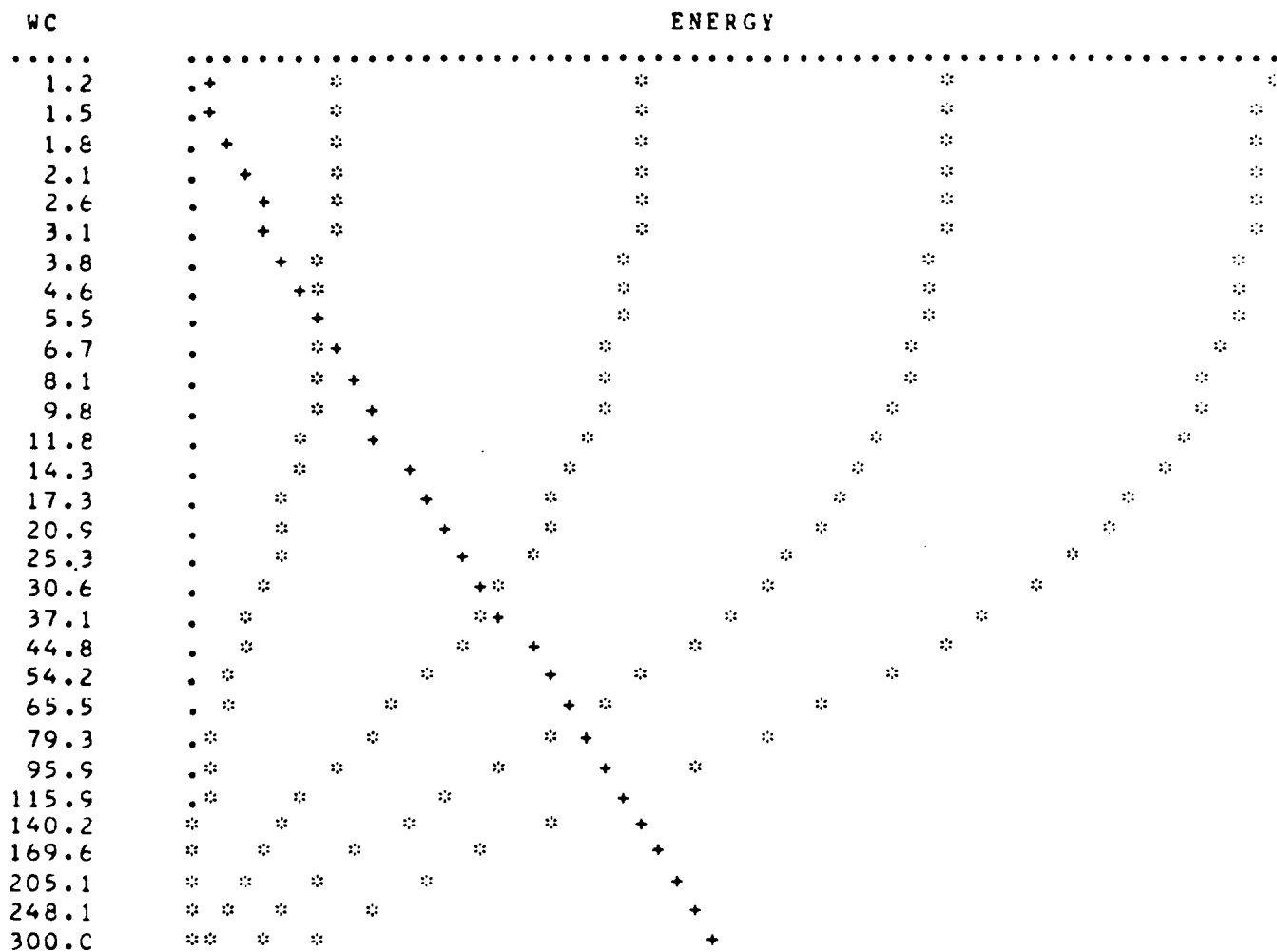


Figure 11

$W_c (\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	6.788	55.093	167.107	279.456	391.944	504.514
1.5	11.750	54.793	166.582	278.776	391.138	503.598
1.8	16.816	54.433	165.949	277.955	390.164	502.493
2.1	21.871	54.001	165.187	276.966	388.991	501.159
2.6	26.964	53.483	164.270	275.774	387.576	499.552
3.1	32.106	52.864	163.168	274.340	385.872	497.614
3.8	37.314	52.124	161.845	272.616	383.821	495.280
4.6	42.608	51.243	160.260	270.545	381.355	492.473
5.5	48.016	50.199	158.364	268.062	378.394	489.099
6.7	53.575	48.965	156.101	265.089	374.844	485.050
8.1	59.330	47.514	153.409	261.539	370.596	480.199
9.8	65.342	45.820	150.216	257.310	365.524	474.397
11.8	71.674	43.855	146.446	252.289	359.484	467.476
14.3	78.393	41.597	142.017	246.351	352.316	459.242
17.3	85.533	39.033	136.847	239.362	343.843	449.484
20.9	93.064	36.161	130.858	231.184	333.877	437.966
25.3	100.853	32.995	123.986	221.685	322.225	424.445
30.6	108.706	29.579	116.190	210.747	308.702	408.674
37.1	116.498	25.980	107.471	198.287	293.148	390.422
44.8	124.285	22.299	97.885	184.278	275.454	369.503
54.2	132.167	18.659	87.562	168.780	255.595	345.806
65.5	140.013	15.196	76.723	151.964	233.668	319.348
79.3	147.575	12.037	65.673	134.143	209.938	290.321
95.9	154.875	9.290	54.791	115.781	184.865	259.145
115.9	161.845	6.978	44.485	97.472	159.121	226.506
140.2	168.371	5.133	35.130	79.890	133.557	193.354
169.6	174.430	3.707	27.007	63.692	109.121	160.839
205.1	179.983	2.638	20.254	49.410	86.719	130.185
248.1	185.014	1.856	14.865	37.360	67.067	102.497
300.0	189.546	1.295	10.715	27.612	50.570	78.570

Table 11A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	617.139	729.805	842.502	955.225	1067.970
1.5	616.126	728.703	841.318	953.964	1066.635
1.8	614.902	727.372	839.887	952.440	1065.023
2.1	613.426	725.765	838.160	950.600	1063.077
2.6	611.646	723.827	836.076	948.380	1060.729
3.1	609.499	721.490	833.563	945.702	1057.895
3.8	606.913	718.674	830.534	942.473	1054.478
4.6	603.801	715.283	826.885	938.583	1050.361
5.5	600.058	711.203	822.493	933.900	1045.403
6.7	595.563	706.301	817.214	928.267	1039.438
8.1	590.172	700.417	810.874	921.501	1032.270
9.8	583.718	693.368	803.273	913.385	1023.668
11.8	576.008	684.938	794.178	903.666	1013.361
14.3	566.822	674.863	783.317	892.052	1001.036
17.3	555.913	662.923	770.384	878.209	986.335
20.9	543.007	648.748	755.035	861.760	968.849
25.3	527.811	632.023	736.891	842.289	948.125
30.6	510.024	612.391	715.549	819.346	923.672
37.1	489.349	589.497	690.597	792.465	894.971
44.8	465.525	563.010	661.637	761.186	861.500
54.2	438.362	532.663	628.326	725.094	822.778
65.5	407.792	498.302	590.431	683.874	778.412
79.3	373.927	459.956	547.895	637.389	728.180
95.9	337.125	417.914	500.929	585.765	672.126
115.9	298.052	372.795	450.093	529.496	610.669
140.2	257.701	325.601	396.375	469.535	544.718
169.6	217.364	277.717	341.212	407.346	475.739
205.1	178.515	230.812	286.426	344.867	405.754
248.1	142.611	186.652	234.047	284.350	337.207
300.0	110.849	146.821	186.021	228.075	272.675

Table 11B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.11924E 12	.16791E 10	.21749E 8	.28002E 6	.36828E 4
1.5	.14416E 12	.20791E 10	.27099E 8	.35059E 6	.46030E 4
1.8	.17427E 12	.25871E 10	.33977E 8	.44215E 6	.58125E 4
2.1	.21065E 12	.32390E 10	.42930E 8	.56264E 6	.74202E 4
2.6	.25459E 12	.40849E 10	.54748E 8	.72374E 6	.95834E 4
3.1	.30764E 12	.51980E 10	.70614E 8	.94326E 6	.12585E 5
3.6	.37166E 12	.66864E 10	.92339E 8	.12491E 7	.16819E 5
4.6	.44884E 12	.87151E 10	.12279E 9	.16866E 7	.22975E 5
5.5	.54181E 12	.11542E 11	.16663E 9	.23316E 7	.32242E 5
6.7	.65361E 12	.15583E 11	.23179E 9	.33167E 7	.46722E 5
8.1	.78774E 12	.21532E 11	.33225E 9	.48845E 7	.70381E 5
9.8	.94807E 12	.30576E 11	.49375E 9	.75001E 7	.11112E 6
11.9	.11386E 13	.44814E 11	.76603E 9	.12106E 8	.18551E 6
14.3	.13629E 13	.68016E 11	.12497E 10	.20718E 8	.33078E 6
17.3	.16229E 13	.10694E 12	.21579E 10	.37909E 8	.63604E 6
20.9	.19175E 13	.17320E 12	.39585E 10	.74606E 8	.13291E 7
25.3	.22408E 13	.28476E 12	.77107E 10	.15830E 9	.30316E 7
30.5	.25832E 13	.46449E 12	.15876E 11	.36194E 9	.75626E 7
36.1	.29362E 13	.73397E 12	.34374E 11	.89299E 9	.20718E 8
43.1	.32963E 13	.11048E 13	.77811E 11	.23915E 10	.62916E 8
51.3	.36613E 13	.15709E 13	.18048E 12	.69769E 10	.21350E 9
60.7	.40214E 13	.21046E 13	.40600E 12	.21882E 11	.80488E 9
72.3	.43640E 13	.26686E 13	.81995E 12	.71276E 11	.33111E 10
86.1	.46861E 13	.32364E 13	.14230E 13	.22657E 12	.14576E 11
102.3	.49834E 13	.37837E 13	.21367E 13	.62113E 12	.65442E 11
120.9	.52521E 13	.42905E 13	.28727E 13	.13119E 13	.26793E 12
141.9	.54925E 13	.47447E 13	.35733E 13	.21646E 13	.82317E 12
166.3	.57052E 13	.51395E 13	.42052E 13	.30221E 13	.17147E 13
195.1	.58920E 13	.54740E 13	.47521E 13	.38024E 13	.26876E 13
228.3	.59557E 13	.57530E 13	.52102E 13	.44740E 13	.35809E 13

Table 11C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.13834E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
1.5	.15092E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
1.8	.16350E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
2.1	.18655E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
2.6	.20961E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
3.1	.25782E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
3.8	.30603E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
4.6	.39197E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
5.5	.52402E	3	.90132E	2	.90132E	2	.90132E	2	.90132E	2
6.7	.74202E	3	.10061E	3	.90132E	2	.90132E	2	.90132E	2
8.1	.10816E	4	.10061E	3	.90132E	2	.90132E	2	.90132E	2
9.8	.17104E	4	.11319E	3	.90132E	2	.90132E	2	.90132E	2
11.8	.28696E	4	.12367E	3	.90132E	2	.90132E	2	.90132E	2
14.3	.52319E	4	.16350E	3	.90132E	2	.90132E	2	.90132E	2
17.3	.10432E	5	.25782E	3	.90132E	2	.90132E	2	.90132E	2
20.9	.22902E	5	.47581E	3	.10061E	3	.90132E	2	.90132E	2
25.3	.55622E	5	.10690E	4	.10061E	3	.90132E	2	.90132E	2
30.6	.14986E	6	.29450E	4	.13834E	3	.90132E	2	.90132E	2
37.1	.45077E	6	.94408E	4	.27040E	3	.90132E	2	.90132E	2
44.8	.15315E	7	.35313E	5	.86359E	3	.10061E	3	.90132E	2
54.2	.59432E	7	.15471E	6	.38987E	4	.17398E	3	.90132E	2
65.5	.26279E	8	.79182E	6	.22489E	5	.69590E	3	.10061E	3
79.3	.13055E	9	.46781E	7	.15577E	6	.49636E	4	.23476E	3
95.9	.71907E	9	.31570E	8	.12712E	7	.47785E	5	.17712E	4
115.9	.42619E	10	.23691E	9	.11902E	8	.55120E	6	.23921E	5
140.2	.25807E	11	.18920E	10	.12247E	9	.72206E	7	.39372E	6
169.6	.14452E	12	.15136E	11	.13079E	10	.10127E	9	.71804E	7
205.1	.60012E	12	.10884E	12	.13409E	11	.14075E	10	.13352E	9
248.1	.15112E	13	.55024E	12	.11615E	12	.17609E	11	.22947E	10
300.0	.25700E	13	.15199E	13	.63481E	12	.16881E	12	.32671E	11

Table 11D

GRAPH OF ENERGY LEVELS VS. WC

NINP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

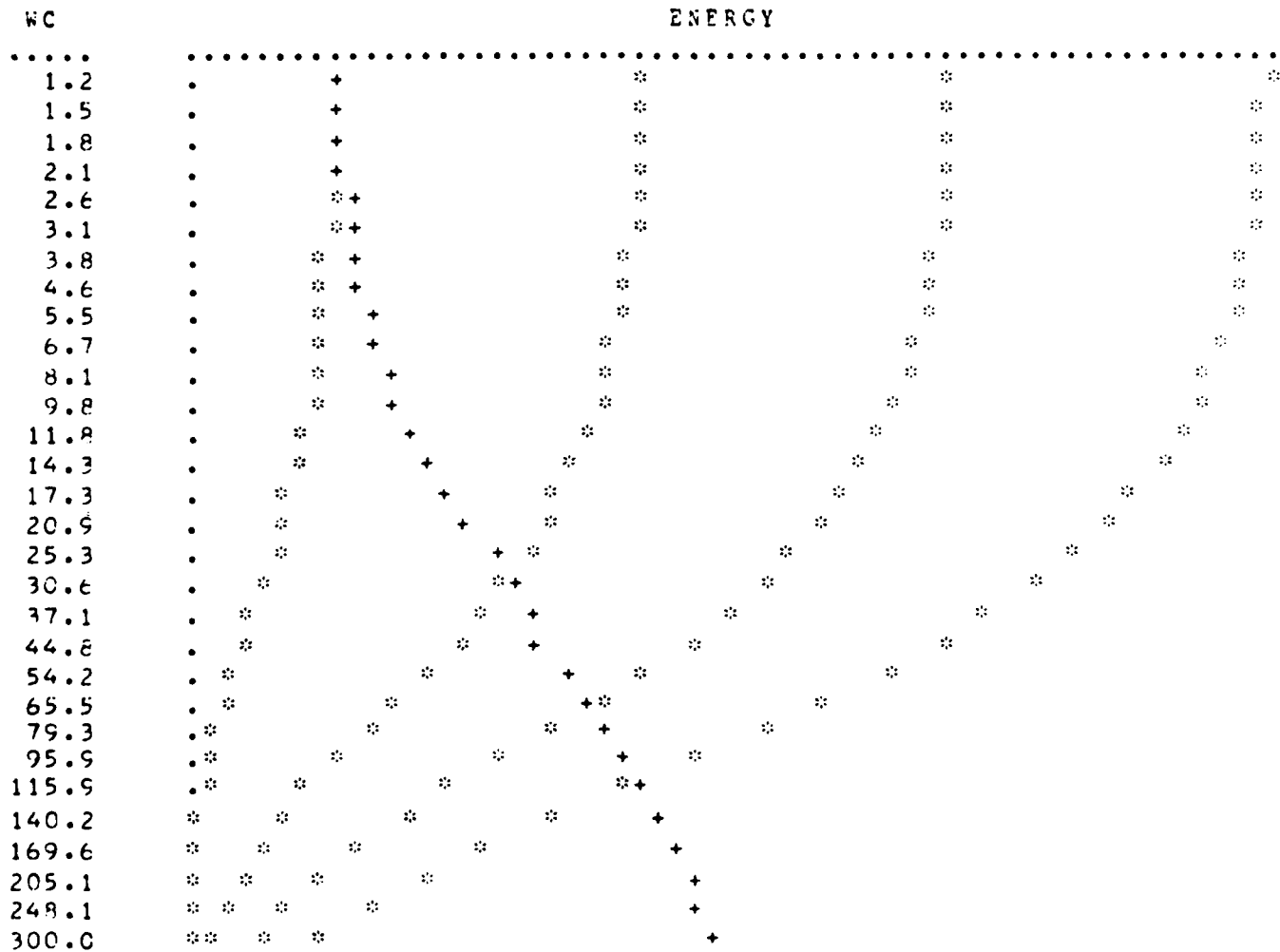


Figure 12

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	53.296	55.093	167.107	279.456	391.944	504.514
1.5	54.692	54.793	166.582	278.776	391.138	503.598
1.8	56.129	54.433	165.949	277.955	390.164	502.493
2.1	57.621	54.001	165.187	276.966	388.991	501.159
2.6	59.186	53.483	164.270	275.774	387.576	499.552
3.1	60.852	52.864	163.168	274.340	385.872	497.614
3.8	62.656	52.124	161.845	272.616	383.821	495.280
4.6	64.647	51.243	160.260	270.545	381.355	492.473
5.5	66.893	50.199	158.364	268.062	378.394	489.099
6.7	69.483	48.965	156.101	265.089	374.844	485.050
8.1	72.534	47.514	153.409	261.539	370.596	480.199
9.8	76.193	45.820	150.216	257.310	365.524	474.397
11.8	80.644	43.855	146.446	252.289	359.484	467.476
14.3	86.113	41.597	142.017	246.351	352.316	459.242
17.3	92.871	39.033	136.847	239.362	343.843	449.484
20.9	101.209	36.161	130.858	231.184	333.877	437.966
25.3	110.894	32.995	123.986	221.685	322.225	424.445
30.6	118.802	29.579	116.190	210.747	308.702	408.674
37.1	124.065	25.980	107.471	198.287	293.148	390.422
44.8	129.726	22.299	97.885	184.278	275.454	369.503
54.2	137.329	18.659	87.562	168.780	255.595	345.806
65.5	146.625	15.196	76.723	151.964	233.668	319.348
79.3	152.637	12.037	65.673	134.143	209.938	290.321
95.9	159.256	9.230	54.791	115.781	184.865	259.145
115.9	166.673	6.978	44.485	97.472	159.121	226.506
140.2	172.345	5.133	35.130	79.890	133.557	193.354
169.6	178.227	3.707	27.007	63.692	109.121	160.839
205.1	183.819	2.638	20.254	49.410	86.719	130.185
248.1	188.629	1.856	14.865	37.360	67.067	102.497
300.0	192.885	1.295	10.715	27.612	50.570	78.570

Table 12A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	617.139	729.805	842.502	955.225	1067.970
1.5	616.126	728.703	841.318	953.964	1066.635
1.8	614.902	727.372	839.887	952.440	1065.023
2.1	613.426	725.765	838.160	950.600	1063.077
2.6	611.646	723.827	836.076	948.380	1060.729
3.1	609.499	721.490	833.563	945.702	1057.895
3.8	606.913	718.674	830.534	942.473	1054.478
4.6	603.801	715.283	826.885	938.583	1050.361
5.5	600.058	711.203	822.493	933.900	1045.403
6.7	595.563	706.301	817.214	928.267	1039.438
8.1	590.172	700.417	810.874	921.501	1032.270
9.8	583.718	693.368	803.273	913.385	1023.668
11.8	576.008	684.938	794.178	903.666	1013.361
14.3	566.822	674.883	783.317	892.052	1001.036
17.3	555.913	662.923	770.384	878.209	986.335
20.9	543.007	648.748	755.035	861.760	968.849
25.3	527.811	632.023	736.891	842.239	948.125
30.6	510.024	612.391	715.549	819.346	923.672
37.1	489.349	589.497	690.597	792.465	894.971
44.8	465.525	563.010	661.637	761.186	861.500
54.2	438.362	532.663	628.326	725.094	822.778
65.5	407.792	498.302	590.431	683.874	778.412
79.3	373.927	459.956	547.895	637.389	728.180
95.9	337.125	417.914	500.929	585.765	672.126
115.9	298.052	372.795	450.093	529.496	610.669
140.2	257.701	325.601	396.375	469.535	544.718
169.6	217.364	277.717	341.212	407.346	475.739
205.1	178.515	230.812	286.426	344.867	405.754
248.1	142.611	186.652	234.047	284.350	337.207
300.0	110.849	146.821	186.021	229.075	272.675

Table 12 B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.12094E 12	.75616E 4	.23134E 2	.23134E 2	.23134E 2
1.5	.14627E 12	.10095E 5	.23134E 2	.23134E 2	.23134E 2
1.8	.17689E 12	.13783E 5	.23134E 2	.23134E 2	.23134E 2
2.1	.21394E 12	.19350E 5	.23134E 2	.23134E 2	.23134E 2
2.6	.25873E 12	.28123E 5	.23134E 2	.23134E 2	.23134E 2
3.1	.31291E 12	.42675E 5	.23134E 2	.23134E 2	.23134E 2
3.8	.37844E 12	.68357E 5	.23134E 2	.23134E 2	.23134E 2
4.6	.45768E 12	.11719E 6	.23134E 2	.23134E 2	.23134E 2
5.5	.55352E 12	.21879E 6	.23134E 2	.23134E 2	.23134E 2
6.7	.66943E 12	.45474E 6	.23134E 2	.23134E 2	.23134E 2
8.1	.80961E 12	.10809E 7	.23134E 2	.23134E 2	.23134E 2
9.8	.97915E 12	.30369E 7	.23134E 2	.23134E 2	.23134E 2
11.8	.11842E 13	.10489E 8	.23134E 2	.23134E 2	.23134E 2
14.3	.14321E 13	.46636E 8	.29052E 2	.23134E 2	.23134E 2
17.3	.17318E 13	.28150E 9	.78548E 2	.23134E 2	.23134E 2
20.9	.20923E 13	.24286E 10	.68164E 3	.23134E 2	.23134E 2
25.3	.25056E 13	.27756E 11	.11908E 5	.23134E 2	.23134E 2
30.6	.28699E 13	.19400E 12	.20371E 6	.23134E 2	.23134E 2
37.1	.31549E 13	.55055E 12	.29470E 7	.25824E 2	.23134E 2
44.8	.34554E 13	.10259E 13	.57174E 8	.85004E 2	.23134E 2
54.2	.38171E 13	.16009E 13	.18535E 10	.38757E 4	.23134E 2
65.5	.42275E 13	.22484E 13	.78850E 11	.42650E 6	.23134E 2
79.3	.45225E 13	.27972E 13	.60760E 12	.37780E 8	.22811E 3
95.9	.48240E 13	.33602E 13	.13987E 13	.44443E 10	.61517E 5
115.9	.51366E 13	.39302E 13	.22259E 13	.30218E 12	.25790E 8
140.2	.53785E 13	.44136E 13	.29738E 13	.12482E 13	.88022E 10
169.6	.56135E 13	.48641E 13	.36641E 13	.22229E 13	.57427E 12
205.1	.58278E 13	.52611E 13	.43233E 13	.31233E 13	.17252E 13
248.1	.60076E 13	.55892E 13	.48656E 13	.39101E 13	.27705E 13
300.0	.61625E 13	.58596E 13	.53160E 13	.45776E 13	.36770E 13

Table 12C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
1.5	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
1.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
2.1	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
2.6	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
3.1	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
3.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
4.6	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
5.5	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
6.7	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
8.1	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
9.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
11.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
14.3	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
17.3	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
20.9	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
25.3	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
30.6	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
37.1	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
44.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
54.2	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
65.5	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
79.3	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
95.9	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
115.9	.55683E	3	.23134E	2	.23134E	2	.23134E	2	.23134E	2
140.2	.55008E	6	.41964E	2	.23134E	2	.23134E	2	.23134E	2
169.6	.58347E	9	.65336E	5	.25824E	2	.23134E	2	.23134E	2
205.1	.24980E	12	.17866E	9	.40843E	5	.29052E	2	.23134E	2
248.1	.14804E	13	.18204E	12	.22652E	9	.11530E	6	.63484E	2
300.0	.26387E	13	.14819E	13	.28565E	12	.10567E	10	.12730E	7

Table 12D

GRAPH OF ENERGY LEVELS VS. WC

NINP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER
TEMPERATURE = 300.0 DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

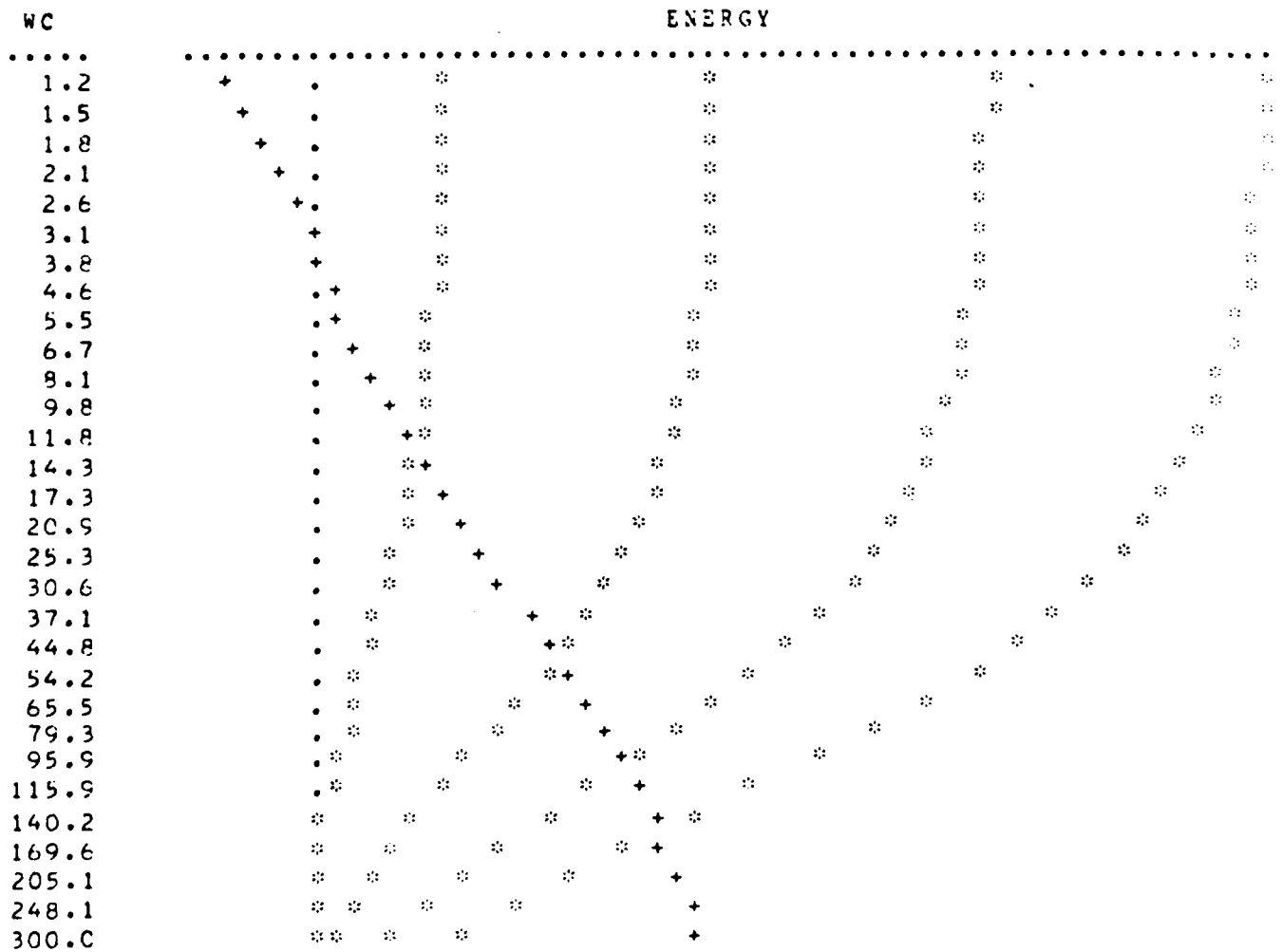


Figure 13

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-28.978	39.118	118.445	197.971	277.580	357.238
1.5	-24.070	38.939	118.132	197.566	277.100	356.693
1.8	-19.162	38.724	117.755	197.077	276.520	356.034
2.1	-14.253	38.465	117.300	196.487	275.820	355.240
2.6	-9.342	38.155	116.752	195.776	274.977	354.281
3.1	-4.429	37.783	116.093	194.920	273.959	353.125
3.8	.489	37.338	115.301	193.889	272.734	351.732
4.6	5.415	36.806	114.351	192.649	271.260	350.055
5.5	10.352	36.174	113.212	191.161	269.488	348.037
6.7	15.308	35.424	111.850	189.377	267.360	345.612
8.1	20.291	34.539	110.225	187.241	264.810	342.703
9.8	25.312	33.499	108.291	184.692	261.758	339.217
11.8	30.384	32.284	106.000	181.655	258.115	335.050
14.3	35.525	30.877	103.295	178.051	253.779	330.079
17.3	40.750	29.262	100.119	173.790	248.633	324.168
20.9	46.074	27.430	96.414	168.777	242.554	317.164
25.3	51.497	25.379	92.126	162.916	235.407	309.902
30.6	57.001	23.124	87.209	156.112	227.056	299.207
37.1	62.546	20.694	81.639	148.284	217.370	287.906
44.8	68.084	18.141	75.417	139.377	206.240	274.838
54.2	73.571	15.537	68.588	129.375	193.593	259.874
65.5	78.982	12.970	61.249	118.327	179.417	242.943
79.3	84.277	10.537	53.562	106.363	163.790	224.066
95.9	89.393	8.326	45.747	93.714	146.911	203.391
115.9	94.276	6.405	38.077	80.715	129.118	181.232
140.2	98.885	4.806	30.839	67.794	110.900	158.091
169.6	103.179	3.529	24.295	55.431	92.867	134.654
205.1	107.131	2.544	18.634	44.084	75.690	111.745
248.1	110.728	1.809	13.946	34.118	60.004	90.226
300.0	113.975	1.272	10.217	25.742	46.298	70.864

Table 13A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	436.928	516.643	596.376	676.125	755.886
1.5	436.325	515.987	595.671	675.374	755.092
1.8	435.596	515.194	594.819	674.467	754.132
2.1	434.717	514.237	593.791	673.371	752.973
2.6	433.656	513.082	592.549	672.046	751.574
3.1	432.376	511.689	591.051	670.452	749.886
3.8	430.833	510.009	589.244	668.527	747.849
4.6	428.974	507.984	587.066	666.206	745.392
5.5	426.737	505.547	584.443	663.409	742.432
6.7	424.046	502.615	581.287	660.043	738.869
8.1	420.816	499.091	577.492	655.995	734.581
9.8	416.942	494.863	572.937	651.133	729.430
11.8	412.306	489.799	567.476	645.301	723.248
14.3	406.768	483.744	560.941	638.318	715.844
17.3	400.172	476.522	553.141	629.976	706.991
20.9	392.341	467.936	543.855	620.036	696.433
25.3	383.081	457.763	532.838	608.228	683.879
30.6	372.182	445.765	519.819	594.255	669.006
37.1	359.152	431.689	504.514	577.799	651.464
44.8	344.622	415.284	486.630	558.529	630.885
54.2	327.571	396.320	465.889	536.121	606.902
65.5	308.152	374.613	442.053	510.286	579.178
79.3	286.323	350.063	414.966	480.812	547.443
95.9	262.180	322.706	384.602	447.613	511.555
115.9	235.993	292.764	351.129	410.799	471.563
140.2	208.252	260.697	314.969	370.747	427.794
169.6	179.681	227.240	276.849	328.162	380.922
205.1	151.206	193.392	237.811	284.110	332.020
248.1	123.882	160.347	199.163	239.987	282.551
300.0	98.723	129.350	162.346	197.398	234.259

Table 13B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.57573E 11	.27638E 10	.12756E 9	.58602E 7	.26877E 6
1.5	.69587E 11	.33814E 10	.15668E 9	.72189E 7	.33190E 6
1.8	.84098E 11	.41469E 10	.19307E 9	.89270E 7	.41166E 6
2.1	.10162E 12	.51005E 10	.23884E 9	.11091E 8	.51331E 6
2.6	.12276E 12	.62954E 10	.29687E 9	.13857E 8	.64415E 6
3.1	.14826E 12	.78032E 10	.37112E 9	.17431E 8	.81464E 6
3.8	.17901E 12	.97214E 10	.46715E 9	.22108E 8	.10400E 7
4.6	.21603E 12	.12185E 11	.59297E 9	.28321E 8	.13427E 7
5.5	.26058E 12	.15386E 11	.76029E 9	.36717E 8	.17573E 7
6.7	.31408E 12	.19597E 11	.98672E 9	.48295E 8	.23382E 7
8.1	.37822E 12	.25221E 11	.12994E 10	.64639E 8	.31733E 7
9.8	.45488E 12	.32856E 11	.17412E 10	.88337E 8	.44101E 7
11.8	.54617E 12	.43410E 11	.23820E 10	.12376E 9	.63056E 7
14.3	.65427E 12	.58279E 11	.33393E 10	.17859E 9	.93250E 7
17.3	.78130E 12	.79675E 11	.48161E 10	.26676E 9	.14348E 8
20.9	.92897E 12	.11079E 12	.71743E 10	.41468E 9	.23119E 8
25.3	.10981E 13	.15680E 12	.11076E 11	.67435E 9	.39259E 8
30.6	.12881E 13	.22490E 12	.17761E 11	.11524E 10	.70689E 8
37.1	.14963E 13	.32458E 12	.29588E 11	.20764E 10	.13566E 9
44.8	.17188E 13	.46657E 12	.51076E 11	.39530E 10	.27867E 9
54.2	.19503E 13	.66018E 12	.90781E 11	.79551E 10	.61475E 9
65.5	.21855E 13	.90935E 12	.16404E 12	.16884E 11	.14586E 10
79.3	.24184E 13	.12090E 13	.29465E 12	.37467E 11	.37116E 10
95.9	.26429E 13	.15448E 13	.50959E 12	.85244E 11	.10031E 11
115.9	.28537E 13	.18971E 13	.82257E 12	.19191E 12	.28249E 11
140.2	.30476E 13	.22464E 13	.12183E 13	.40521E 12	.80105E 11
169.6	.32227E 13	.25757E 13	.16575E 13	.75845E 12	.21542E 12
205.1	.33785E 13	.28732E 13	.20974E 13	.12270E 13	.50527E 12
248.1	.35156E 13	.31324E 13	.25060E 13	.17408E 13	.96964E 12
300.0	.36357E 13	.33523E 13	.28650E 13	.22353E 13	.15303E 13

Table 13C

AD-A132 363

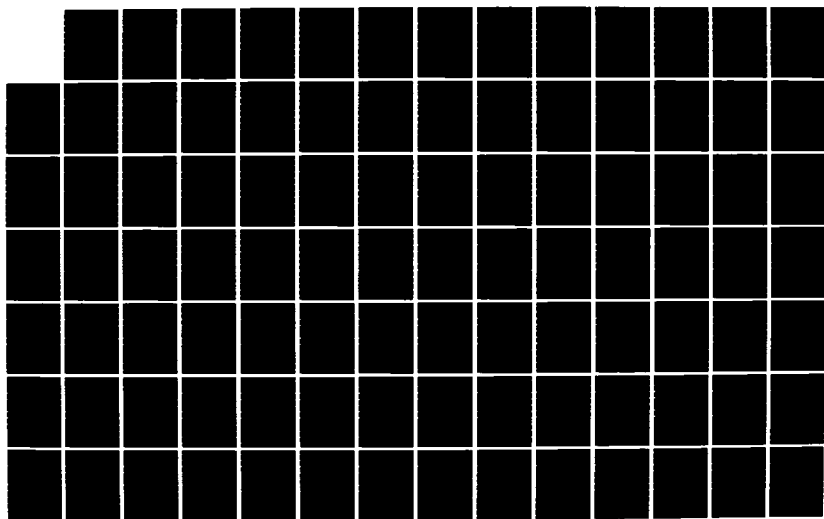
SUBBANDING CHARGE TRANSPORT AND RELATED APPLICATIONS IN
SEMICONDUCTOR DEVICES(U) HAWAII UNIV AT MANOA HONOLULU
DEPT OF ELECTRICAL ENGINEERING. J W HOLM-KENNEDY
OCT 77 N00014-76-C-1081

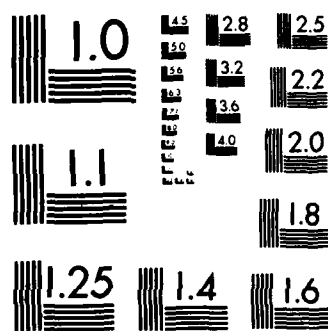
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.12392E	5	.65817E	3	.11319E	3	.90132E	2	.90132E	2
1.5	.15318E	5	.79233E	3	.12367E	3	.90132E	2	.90132E	2
1.8	.19033E	5	.96001E	3	.12367E	3	.90132E	2	.90132E	2
2.1	.23787E	5	.11780E	4	.13634E	3	.90132E	2	.90132E	2
2.6	.29943E	5	.14673E	4	.15092E	3	.90132E	2	.90132E	2
3.1	.38023E	5	.18550E	4	.17398E	3	.90132E	2	.90132E	2
3.8	.48799E	5	.23623E	4	.20123E	3	.90132E	2	.90132E	2
4.6	.63424E	5	.30666E	4	.23476E	3	.10061E	3	.90132E	2
5.5	.83699E	5	.40455E	4	.27040E	3	.10061E	3	.90132E	2
6.7	.11249E	6	.54603E	4	.34166E	3	.10061E	3	.90132E	2
8.1	.15453E	6	.75659E	4	.45276E	3	.10061E	3	.90132E	2
9.8	.21799E	6	.10772E	5	.61206E	3	.11319E	3	.90132E	2
11.6	.31735E	6	.15911E	5	.87617E	3	.12367E	3	.90132E	2
14.3	.47968E	6	.24487E	5	.13247E	4	.15092E	3	.90132E	2
17.3	.75785E	6	.39570E	5	.21233E	4	.20123E	3	.90132E	2
20.9	.12608E	7	.67731E	5	.36703E	4	.28507E	3	.10061E	3
25.3	.22252E	7	.12377E	6	.68647E	4	.45276E	3	.11319E	3
30.6	.41977E	7	.24355E	6	.13952E	5	.86359E	3	.13834E	3
37.1	.85207E	7	.52030E	6	.31152E	5	.19158E	4	.20123E	3
44.8	.18725E	8	.12160E	7	.76983E	5	.48546E	4	.38149E	3
54.2	.44798E	8	.31321E	7	.21227E	6	.14096E	5	.99774E	3
65.5	.11706E	9	.89445E	7	.65805E	6	.47024E	5	.33559E	4
79.3	.33433E	9	.28385E	8	.23036E	7	.18032E	6	.13769E	5
95.9	.10369E	10	.99725E	8	.90919E	7	.79393E	6	.66947E	5
115.9	.34454E	10	.38370E	9	.40108E	8	.39854E	7	.37967E	6
140.2	.11985E	11	.15850E	10	.19423E	9	.22439E	8	.24679E	7
169.6	.41983E	11	.68087E	10	.10020E	10	.13765E	9	.17872E	8
205.1	.13875E	12	.29006E	11	.52751E	10	.88166E	9	.13815E	9
248.1	.39125E	12	.11372E	12	.26702E	11	.55722E	10	.10762E	10
300.0	.85714E	12	.36515E	12	.11896E	12	.32308E	11	.78753E	10

Table 13D

GRAPH OF ENERGY LEVELS VS. WC

NINP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

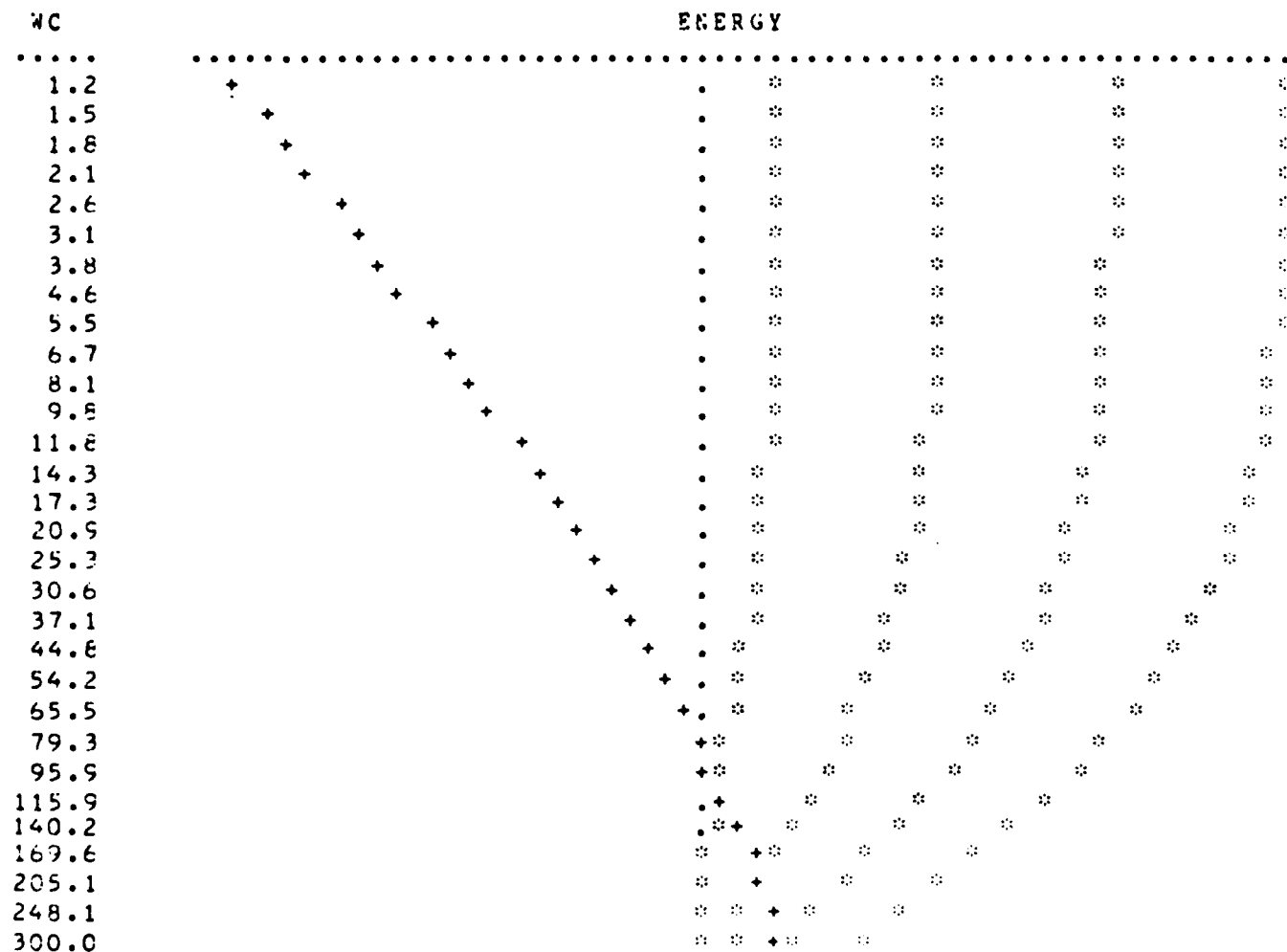


Figure 14

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-99.100	17.621	53.192	88.823	124.478	160.148
1.5	-94.230	17.568	53.098	88.701	124.334	159.985
1.8	-89.368	17.503	52.985	88.554	124.160	159.787
2.1	-84.517	17.424	52.848	88.377	123.950	159.549
2.6	-79.679	17.330	52.683	88.163	123.696	159.260
3.1	-74.856	17.217	52.484	87.905	123.390	158.913
3.8	-70.051	17.081	52.244	87.594	123.021	158.493
4.6	-65.268	16.918	51.956	87.219	122.576	157.987
5.5	-60.512	16.723	51.609	86.768	122.040	157.378
6.7	-55.786	16.490	51.193	86.225	121.394	156.644
8.1	-51.096	16.213	50.694	85.574	120.619	155.761
9.8	-46.450	15.884	50.097	84.792	119.687	154.699
11.8	-41.853	15.496	49.385	83.857	118.570	153.425
14.3	-37.316	15.039	48.538	82.740	117.233	151.899
17.3	-32.845	14.505	47.533	81.409	115.637	150.073
20.9	-28.452	13.887	46.346	79.828	113.736	147.895
25.3	-24.147	13.175	44.951	77.959	111.480	145.303
30.6	-19.940	12.367	43.323	75.759	108.813	142.232
37.1	-15.841	11.461	41.437	73.184	105.675	138.606
44.8	-11.863	10.463	39.272	70.192	102.006	134.349
54.2	-8.014	9.385	36.815	66.746	97.747	129.382
65.5	-4.306	8.248	34.065	62.820	92.847	123.633
79.3	-0.749	7.084	31.041	58.403	87.270	117.042
95.9	2.646	5.932	27.783	53.515	81.009	109.573
115.9	5.865	4.834	24.358	48.207	74.093	101.230
140.2	8.893	3.832	20.864	42.579	66.603	92.072
169.6	11.718	2.957	17.420	36.775	58.683	82.230
205.1	14.329	2.225	14.154	30.982	50.545	71.917
248.1	16.721	1.637	11.186	25.413	42.455	61.433
300.0	18.900	1.183	8.606	20.276	34.714	51.141

Table 14A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	195.828	231.515	267.207	302.904	338.605
1.5	195.647	231.316	266.996	302.679	338.367
1.8	195.429	231.080	266.741	302.407	338.080
2.1	195.165	230.793	266.432	302.079	337.732
2.6	194.846	230.447	266.059	301.682	337.312
3.1	194.461	230.028	265.609	301.202	336.805
3.8	193.997	229.523	265.066	300.624	336.193
4.6	193.436	228.913	264.411	299.925	335.454
5.5	192.761	228.178	263.620	299.083	334.563
6.7	191.948	227.292	262.667	298.067	333.498
8.1	190.968	226.225	261.519	296.843	332.193
9.8	189.791	224.941	260.137	295.370	330.633
11.9	188.376	223.399	258.476	293.598	328.756
14.3	186.680	221.548	256.481	291.469	326.501
17.3	184.649	219.329	254.090	288.915	323.794
20.9	182.223	216.677	251.228	285.857	320.551
25.3	179.332	213.512	247.810	282.202	316.673
30.6	175.899	209.748	243.740	277.846	312.046
37.1	171.836	205.287	238.909	272.669	306.543
44.9	167.052	200.021	233.197	266.540	300.020
54.2	161.451	193.840	226.478	259.317	292.322
65.5	154.940	186.631	218.621	250.853	283.286
79.3	147.435	178.288	209.500	241.002	272.745
95.9	138.875	168.726	199.005	229.632	260.548
115.9	129.237	157.895	187.063	216.644	246.569
140.2	118.556	145.803	173.652	201.990	230.736
169.6	106.942	132.539	158.837	185.708	213.060
205.1	94.602	118.294	142.791	167.952	193.670
248.1	81.848	103.383	125.224	149.017	172.848
300.0	69.086	88.240	109.385	129.363	151.054

Table 14B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.90327E 10	.22898E 10	.57738E 9	.14534E 9	.36556E 8
1.5	.10916E 11	.27740E 10	.70037E 9	.17646E 9	.44418E 8
1.8	.13191E 11	.33617E 10	.85007E 9	.21442E 9	.54023E 8
2.1	.15937E 11	.40756E 10	.10326E 10	.26080E 9	.65782E 8
2.6	.19250E 11	.49437E 10	.12553E 10	.31758E 9	.80215E 8
3.1	.23245E 11	.60003E 10	.15278E 10	.38729E 9	.97981E 8
3.8	.28060E 11	.72880E 10	.18619E 10	.47311E 9	.11993E 9
4.6	.33860E 11	.88598E 10	.22727E 10	.57915E 9	.14716E 9
5.5	.40838E 11	.10782E 11	.27792E 10	.71074E 9	.18113E 9
6.7	.49225E 11	.13137E 11	.34064E 10	.87485E 9	.22373E 9
8.1	.59292E 11	.16029E 11	.41865E 10	.10807E 10	.27756E 9
9.8	.71353E 11	.19593E 11	.51620E 10	.13409E 10	.34615E 9
11.8	.85774E 11	.23997E 11	.63893E 10	.16723E 10	.43441E 9
14.3	.10297E 12	.29459E 11	.79448E 10	.20986E 10	.54927E 9
17.3	.12341E 12	.36261E 11	.99324E 10	.26530E 10	.70073E 9
20.9	.14760E 12	.44769E 11	.12496E 11	.33931E 10	.90350E 9
25.3	.17608E 12	.55455E 11	.15837E 11	.43585E 10	.11797E 10
30.6	.20939E 12	.68935E 11	.20239E 11	.56822E 10	.15631E 10
37.1	.24802E 12	.85997E 11	.26109E 11	.75100E 10	.21069E 10
44.3	.29236E 12	.10764E 12	.34029E 11	.10081E 11	.28962E 10
54.2	.34259E 12	.13508E 12	.44832E 11	.13765E 11	.40707E 10
65.5	.39856E 12	.16974E 12	.59700E 11	.19144E 11	.58632E 10
79.3	.45971E 12	.21312E 12	.80265E 11	.27129E 11	.86637E 10
95.9	.52500E 12	.26056E 12	.10868E 12	.39133E 11	.13163E 11
115.9	.59290E 12	.33086E 12	.14758E 12	.57290E 11	.20498E 11
140.2	.66154E 12	.40574E 12	.19971E 12	.84645E 11	.32609E 11
169.6	.72896E 12	.48952E 12	.26727E 12	.12513E 12	.52596E 11
205.1	.79342E 12	.57899E 12	.35077E 12	.18239E 12	.85022E 11
245.1	.85365E 12	.66993E 12	.44808E 12	.26133E 12	.13564E 12
300.0	.90902E 12	.75811E 12	.55434E 12	.36016E 12	.20987E 12

Table 14C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.91911E	7	.23102E	7	.58060E	6	.14595E	6	.36730E	5
1.5	.111175E	8	.23106E	7	.70676E	6	.17773E	6	.44737E	5
1.8	.13603E	8	.34237E	7	.86149E	6	.21677E	6	.54592E	5
2.1	.16580E	8	.41768E	7	.10518E	7	.26485E	6	.66727E	5
2.6	.20242E	8	.51048E	7	.12868E	7	.32431E	6	.81765E	5
3.1	.24761E	8	.62526E	7	.15781E	7	.39815E	6	.10046E	6
3.8	.30361E	8	.76789E	7	.19409E	7	.49033E	6	.12357E	6
4.6	.37334E	8	.94606E	7	.23954E	7	.60617E	6	.15336E	6
5.5	.46067E	8	.11701E	8	.29690E	7	.75281E	6	.19080E	6
6.7	.57079E	8	.14539E	8	.36937E	7	.94008E	6	.23880E	6
8.1	.71078E	8	.18166E	8	.46360E	7	.11818E	7	.30100E	6
9.8	.89045E	8	.22851E	8	.56539E	7	.14975E	7	.38269E	6
11.8	.11236E	9	.25979E	8	.74576E	7	.19160E	7	.49158E	6
14.3	.14301E	9	.37106E	8	.96024E	7	.24798E	7	.63935E	6
17.3	.18391E	9	.48066E	8	.12523E	8	.32543E	7	.84399E	6
20.9	.23944E	9	.63131E	8	.16581E	8	.43418E	7	.11341E	7
25.3	.31631E	9	.84289E	8	.22357E	8	.59080E	7	.15566E	7
30.6	.42510E	9	.11474E	9	.30797E	8	.82291E	7	.21909E	7
37.1	.58290E	9	.15979E	9	.43507E	8	.11732E	8	.31766E	7
44.8	.81807E	9	.22850E	9	.63299E	8	.17421E	8	.47692E	7
54.2	.11790E	10	.33683E	9	.95076E	8	.26738E	8	.74556E	7
65.5	.17502E	10	.51386E	9	.14905E	9	.42824E	8	.12209E	8
79.3	.26839E	10	.81424E	9	.24343E	9	.71947E	8	.21066E	8
95.9	.42584E	10	.13439E	10	.41662E	9	.12738E	9	.30512E	8
115.9	.69916E	10	.23131E	10	.74893E	9	.23848E	9	.74919E	8
140.2	.11850E	11	.41479E	10	.14143E	10	.47267E	9	.15543E	9
169.6	.20610E	11	.77141E	10	.27066E	10	.78972E	9	.34358E	9
205.1	.36406E	11	.14747E	11	.57461E	10	.21751E	10	.50470E	9
248.1	.64318E	11	.28566E	11	.12107E	11	.49561E	10	.19744E	10
300.0	.11141E	12	.54956E	11	.25656E	11	.11491E	11	.49936E	10

Table 14D

GRAPH OF ENERGY LEVELS VS. WC

NINP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

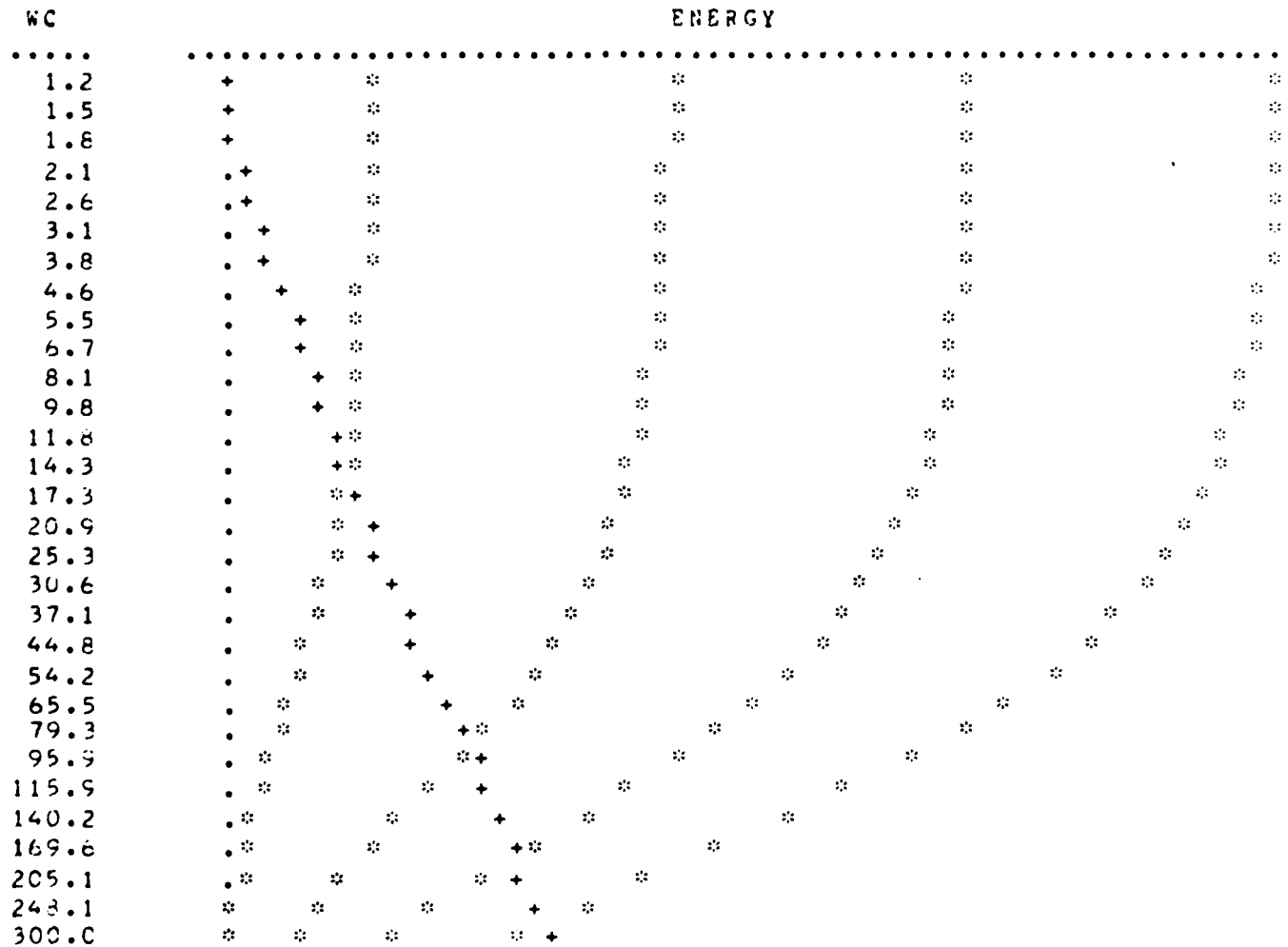


Figure 15

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-1.261	17.621	53.192	88.823	124.478	160.148
1.5	-.014	17.568	53.098	88.701	124.334	159.985
1.8	1.229	17.503	52.985	88.554	124.160	159.787
2.1	2.470	17.424	52.848	88.377	123.950	159.549
2.6	3.706	17.330	52.683	88.163	123.696	159.260
3.1	4.939	17.217	52.484	87.905	123.390	158.913
3.8	6.167	17.081	52.244	87.594	123.021	158.493
4.6	7.390	16.918	51.956	87.219	122.576	157.987
5.5	8.608	16.723	51.609	86.768	122.040	157.378
6.7	9.821	16.490	51.193	86.225	121.394	156.644
8.1	11.031	16.213	50.694	85.574	120.619	155.761
9.8	12.238	15.884	50.097	84.792	119.687	154.699
11.8	13.447	15.496	49.385	83.857	118.570	153.425
14.3	14.663	15.039	48.538	82.740	117.233	151.899
17.3	15.895	14.505	47.533	81.409	115.637	150.073
20.9	17.155	13.887	46.346	79.828	113.736	147.695
25.3	18.462	13.175	44.951	77.959	111.480	145.303
30.6	19.839	12.367	43.323	75.759	108.813	142.232
37.1	21.313	11.461	41.437	73.184	105.675	138.606
44.8	22.904	10.463	39.272	70.192	102.006	134.349
54.2	24.609	9.365	36.815	66.746	97.747	129.382
65.5	26.372	8.248	34.065	62.820	92.847	123.633
79.3	28.098	7.084	31.041	58.403	87.270	117.042
95.9	29.730	5.932	27.783	53.515	81.009	109.573
115.9	31.307	4.834	24.358	48.207	74.093	101.230
140.2	32.891	3.632	20.864	42.579	66.603	92.072
169.6	34.426	2.957	17.420	36.775	58.683	82.230
205.1	35.839	2.225	14.154	30.982	50.545	71.917
248.1	37.169	1.637	11.186	25.413	42.455	61.433
300.0	38.386	1.183	8.606	20.276	34.714	51.141

Table 15A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	195.828	231.515	267.207	302.904	338.605
1.5	195.647	231.318	266.996	302.679	338.367
1.8	195.429	231.080	266.741	302.407	338.080
2.1	195.165	230.793	266.432	302.079	337.732
2.6	194.846	230.447	266.059	301.682	337.312
3.1	194.461	230.026	265.609	301.202	336.805
3.8	193.997	229.523	265.066	300.624	336.193
4.6	193.436	228.913	264.411	299.925	335.454
5.5	192.761	228.178	263.620	299.083	334.563
6.7	191.948	227.292	262.667	298.067	333.488
8.1	190.968	226.225	261.519	296.843	332.193
9.8	189.791	224.941	260.137	295.370	330.633
11.8	188.376	223.399	258.476	293.598	328.756
14.3	186.680	221.546	256.481	291.469	326.501
17.3	184.649	219.329	254.090	288.915	323.794
20.9	182.223	216.677	251.228	285.857	320.551
25.3	179.332	213.512	247.810	282.202	316.673
30.6	175.899	209.748	243.740	277.846	312.046
37.1	171.836	205.287	238.909	272.669	306.543
44.8	167.052	200.021	233.197	266.540	300.020
54.2	161.451	193.840	226.478	259.317	291.322
65.5	154.940	186.631	218.621	250.853	283.236
79.3	147.435	178.288	209.500	241.002	272.745
95.9	138.875	168.726	199.005	229.632	260.548
115.9	129.237	157.895	187.063	216.644	246.569
140.2	118.556	145.803	173.652	201.990	230.736
169.6	106.942	132.539	158.837	185.708	213.060
205.1	94.602	118.294	142.791	167.952	193.670
248.1	81.848	103.383	125.824	149.017	172.848
300.C	69.086	88.240	108.385	129.363	151.054

Table 15B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.12036E 11	.58037E 8	.26970E 6	.12708E 4	.29052E 2
1.5	.14555E 11	.71032E 8	.33147E 6	.15629E 4	.29052E 2
1.8	.17602E 11	.87155E 8	.40877E 6	.19293E 4	.31742E 2
2.1	.21286E 11	.10726E 9	.50617E 6	.23952E 4	.35508E 2
2.6	.25740E 11	.13250E 9	.62991E 6	.29945E 4	.35508E 2
3.1	.31126E 11	.16441E 9	.78864E 6	.37676E 4	.41964E 2
3.8	.37638E 11	.20510E 9	.99461E 6	.47887E 4	.44654E 2
4.6	.45510E 11	.25756E 9	.12655E 7	.61515E 4	.51648E 2
5.5	.55025E 11	.32604E 9	.16277E 7	.80054E 4	.60256E 2
6.7	.66524E 11	.41674E 9	.21209E 7	.10588E 5	.76396E 2
8.1	.80420E 11	.53900E 9	.28079E 7	.14274E 5	.94688E 2
9.8	.97204E 11	.70720E 9	.37896E 7	.19695E 5	.12213E 3
11.8	.11747E 12	.94423E 9	.52358E 7	.27959E 5	.16893E 3
14.3	.14192E 12	.12877E 10	.74429E 7	.41070E 5	.24318E 3
17.3	.17139E 12	.18019E 10	.10953E 8	.62889E 5	.37391E 3
20.9	.20686E 12	.26011E 10	.16808E 8	.10127E 6	.60955E 3
25.3	.24941E 12	.38968E 10	.27131E 8	.17328E 6	.10787E 4
30.6	.30024E 12	.60987E 10	.46525E 8	.31882E 6	.20907E 4
37.1	.36043E 12	.10028E 11	.85655E 8	.63897E 6	.44810E 4
44.8	.43060E 12	.17364E 11	.17090E 9	.14122E 7	.10793E 5
54.2	.51017E 12	.31441E 11	.37131E 9	.34701E 7	.29468E 5
65.5	.59641E 12	.58181E 11	.87451E 9	.94758E 7	.91406E 5
79.3	.68474E 12	.10576E 12	.22011E 10	.28495E 8	.32028E 6
95.9	.77131E 12	.18150E 12	.58326E 10	.93649E 8	.12629E 7
115.9	.85541E 12	.28766E 12	.16073E 11	.33679E 9	.56348E 7
140.2	.93733E 12	.41908E 12	.44530E 11	.13197E 10	.28457E 8
169.6	.10141E 13	.56284E 12	.11344E 12	.54364E 10	.15812E 9
205.1	.10826E 13	.70548E 12	.24000E 12	.22061E 11	.92459E 9
248.1	.11439E 13	.83996E 12	.41164E 12	.79380E 11	.54308E 10
300.0	.11974E 13	.96027E 12	.59599E 12	.21501E 12	.29108E 11

Table 15C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
1.5	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
1.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
2.1	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
2.6	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
3.1	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
3.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
4.6	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
5.5	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
6.7	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
8.1	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
9.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
11.8	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
14.3	.23134E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
17.3	.25824E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
20.9	.25824E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
25.3	.29052E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
30.6	.35508E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
37.1	.53800E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
44.8	.10061E	3	.23134E	2	.23134E	2	.23134E	2	.23134E	2
54.2	.25609E	3	.25824E	2	.23134E	2	.23134E	2	.23134E	2
65.5	.83659E	3	.29052E	2	.23134E	2	.23134E	2	.23134E	2
79.3	.33012E	4	.53800E	2	.23134E	2	.23134E	2	.23134E	2
95.9	.15258E	5	.17045E	3	.25824E	2	.23134E	2	.23134E	2
115.9	.82645E	5	.11223E	4	.35508E	2	.23134E	2	.23134E	2
140.2	.52502E	6	.86537E	4	.15387E	3	.25824E	2	.23134E	2
169.6	.38117E	7	.30403E	5	.15478E	4	.51648E	2	.23134E	2
205.1	.30310E	8	.85188E	6	.21225E	5	.50086E	3	.31742E	2
248.1	.25322E	9	.98567E	7	.33453E	6	.10156E	5	.30236E	3
300.0	.20744E	10	.11609E	9	.55701E	7	.23570E	6	.89603E	4

Table 15D

GRAPH OF ENERGY LEVELS VS. WC

"INP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

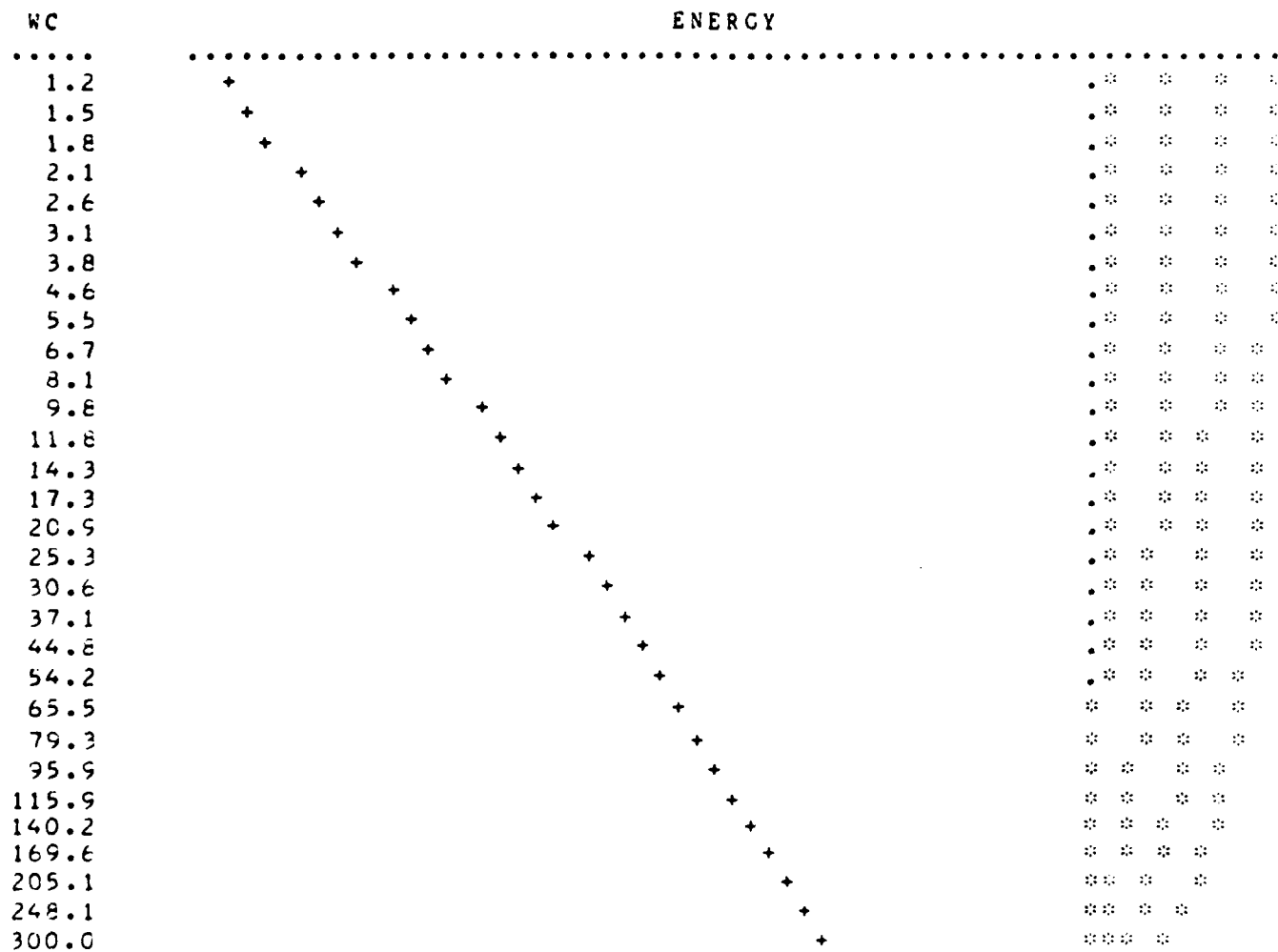


Figure 16

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-189.733	5.608	16.883	28.169	39.459	50.752
1.5	-184.837	5.599	16.866	28.147	39.433	50.722
1.8	-179.945	5.587	16.846	28.121	39.402	50.687
2.1	-175.058	5.573	16.822	28.089	39.365	50.645
2.6	-170.175	5.556	16.792	28.051	39.319	50.593
3.1	-165.300	5.535	16.756	28.005	39.265	50.531
3.8	-160.431	5.511	16.713	27.949	39.198	50.456
4.6	-155.573	5.481	16.661	27.882	39.119	50.365
5.5	-150.725	5.446	16.599	27.800	39.022	50.256
6.7	-145.892	5.403	16.523	27.703	38.906	50.124
8.1	-141.074	5.351	16.433	27.585	38.766	49.965
9.8	-136.276	5.290	16.323	27.443	38.597	49.773
11.8	-131.501	5.217	16.193	27.272	38.394	49.542
14.3	-126.755	5.130	16.036	27.067	38.150	49.264
17.3	-122.041	5.026	15.848	26.821	37.857	48.930
20.9	-117.367	4.904	15.624	26.527	37.506	48.529
25.3	-112.740	4.760	15.357	26.175	37.085	48.049
30.6	-108.168	4.592	15.041	25.756	36.583	47.475
37.1	-103.661	4.397	14.667	25.259	35.985	46.789
44.8	-99.229	4.173	14.228	24.671	35.275	45.974
54.2	-94.884	3.918	13.715	23.978	34.435	45.007
65.5	-90.639	3.633	13.121	23.167	33.447	43.865
79.3	-86.506	3.318	12.439	22.225	32.292	42.525
95.9	-82.501	2.977	11.665	21.139	30.950	40.961
115.9	-78.635	2.618	10.798	19.902	29.406	39.150
140.2	-74.921	2.250	9.844	18.509	27.649	37.073
169.6	-71.369	1.886	8.815	16.968	25.675	34.719
205.1	-67.985	1.538	7.733	15.293	23.493	32.088
248.1	-64.772	1.220	6.628	13.515	21.129	29.199
300.0	-61.722	.942	5.538	11.680	18.628	26.092

Table 16A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	62.046	73.342	84.638	95.936	107.234
1.5	62.014	73.307	84.601	95.896	107.191
1.8	61.975	73.264	84.555	95.847	107.140
2.1	61.928	73.213	84.500	95.789	107.078
2.6	61.871	73.151	84.434	95.718	107.003
3.1	61.802	73.076	84.353	95.632	106.913
3.8	61.719	72.986	84.256	95.529	106.804
4.6	61.619	72.877	84.139	95.404	106.672
5.5	61.498	72.745	83.997	95.253	106.512
6.7	61.352	72.586	83.826	95.071	106.319
8.1	61.175	72.394	83.620	94.851	106.087
9.8	60.963	72.163	83.371	94.586	105.807
11.8	60.707	71.864	83.072	94.267	105.468
14.3	60.399	71.549	82.711	93.882	105.061
17.3	60.028	71.145	82.276	93.418	104.570
20.9	59.583	70.660	81.753	92.861	103.960
25.3	59.050	70.077	81.126	92.191	103.270
30.6	58.411	69.379	80.373	91.387	102.419
37.1	57.647	68.545	79.473	90.425	101.398
44.8	56.737	67.549	78.397	89.275	100.178
54.2	55.657	66.364	77.116	87.904	98.722
65.5	54.378	64.960	75.595	86.275	96.990
79.3	52.872	63.302	73.798	84.345	94.937
95.9	51.108	61.356	71.682	82.072	92.513
115.9	49.057	59.086	69.208	79.407	89.668
140.2	46.693	56.458	66.335	76.304	86.349
169.6	43.996	53.445	63.029	72.723	82.507
205.1	40.957	50.031	59.265	68.630	78.102
248.1	37.588	46.218	55.037	64.010	73.112
300.0	33.923	42.033	50.364	58.875	67.538

Table 16B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.43335E	9	.28016E	9	.18104E	9	.11696E	9	.75560E	8
1.5	.52391E	9	.33880E	9	.21898E	9	.14150E	9	.91422E	8
1.8	.63334E	9	.40971E	9	.26488E	9	.17119E	9	.11062E	9
2.1	.76555E	9	.49546E	9	.32040E	9	.20713E	9	.13387E	9
2.6	.92527E	9	.59913E	9	.38759E	9	.25063E	9	.16203E	9
3.1	.11181E	10	.72449E	9	.46888E	9	.30331E	9	.19614E	9
3.8	.13510E	10	.87604E	9	.56726E	9	.36710E	9	.23748E	9
4.6	.16321E	10	.10593E	10	.68634E	9	.44439E	9	.28761E	9
5.5	.19711E	10	.12807E	10	.83047E	9	.53804E	9	.34840E	9
6.7	.23799E	10	.15484E	10	.10050E	10	.65159E	9	.42219E	9
8.1	.28724E	10	.18719E	10	.12163E	10	.78932E	9	.51183E	9
9.8	.34654E	10	.22628E	10	.14723E	10	.95647E	9	.62080E	9
11.8	.41787E	10	.27351E	10	.17825E	10	.11595E	10	.75342E	9
14.3	.50356E	10	.33054E	10	.21584E	10	.14063E	10	.91503E	9
17.3	.60637E	10	.39941E	10	.26144E	10	.17066E	10	.11123E	10
20.9	.72948E	10	.48251E	10	.31675E	10	.20725E	10	.13534E	10
25.3	.87661E	10	.58276E	10	.38389E	10	.25189E	10	.16488E	10
30.6	.10520E	11	.70359E	10	.46544E	10	.30643E	10	.20117E	10
37.1	.12603E	11	.84911E	10	.56456E	10	.37322E	10	.24588E	10
44.8	.15069E	11	.10242E	11	.68512E	10	.45516E	10	.30114E	10
54.2	.17973E	11	.12344E	11	.83184E	10	.55594E	10	.36970E	10
65.5	.21373E	11	.14863E	11	.10105E	11	.68022E	10	.45515E	10
79.3	.25326E	11	.17875E	11	.12281E	11	.83388E	10	.56214E	10
95.9	.29882E	11	.21460E	11	.14932E	11	.10244E	11	.69677E	10
115.9	.35079E	11	.25707E	11	.18157E	11	.12611E	11	.86705E	10
140.2	.40935E	11	.30703E	11	.22071E	11	.15557E	11	.10834E	11
169.6	.47447E	11	.36528E	11	.26803E	11	.19224E	11	.13593E	11
205.1	.54579E	11	.43242E	11	.32486E	11	.23778E	11	.17119E	11
248.1	.62279E	11	.50871E	11	.39247E	11	.29405E	11	.21620E	11
300.0	.70483E	11	.59399E	11	.47183E	11	.36299E	11	.27341E	11

Table 16C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.48808E	8	.31526E	8	.20362E	8	.13151E	8	.84939E	7
1.5	.59061E	8	.38153E	8	.24645E	8	.15919E	8	.10282E	8
1.8	.71477E	8	.46180E	8	.29834E	8	.19273E	8	.12450E	8
2.1	.86515E	8	.55905E	8	.36122E	8	.23338E	8	.15078E	8
2.6	.10474E	9	.67691E	8	.43746E	8	.28269E	8	.18266E	8
3.1	.12682E	9	.81983E	8	.52993E	8	.34251E	8	.22136E	8
3.8	.15360E	9	.99322E	8	.64218E	8	.41517E	8	.26838E	8
4.6	.18608E	9	.12037E	9	.77853E	8	.50347E	8	.32555E	8
5.5	.22552E	9	.14595E	9	.94431E	8	.61089E	8	.39515E	8
6.7	.27344E	9	.17705E	9	.11461E	9	.74174E	8	.47999E	8
8.1	.33172E	9	.21492E	9	.13920E	9	.90137E	8	.58357E	8
9.8	.40268E	9	.26108E	9	.16921E	9	.10964E	9	.71029E	8
11.8	.48919E	9	.31745E	9	.20592E	9	.13353E	9	.86567E	8
14.3	.59484E	9	.38643E	9	.25092E	9	.16286E	9	.10567E	9
17.3	.72410E	9	.47103E	9	.30622E	9	.19898E	9	.12925E	9
20.9	.88264E	9	.57507E	9	.37441E	9	.24362E	9	.15844E	9
25.3	.10776E	10	.70346E	9	.45881E	9	.29903E	9	.19478E	9
30.6	.13182E	10	.86250E	9	.56374E	9	.36816E	9	.24026E	9
37.1	.16161E	10	.10604E	10	.69491E	9	.45491E	9	.29755E	9
44.8	.19868E	10	.13081E	10	.85989E	9	.56456E	9	.37029E	9
54.2	.24502E	10	.16199E	10	.10689E	10	.70426E	9	.46345E	9
65.5	.30331E	10	.20152E	10	.13359E	10	.88392E	9	.58401E	9
79.3	.37709E	10	.25205E	10	.16801E	10	.11174E	10	.74186E	9
95.9	.47114E	10	.31720E	10	.21285E	10	.14245E	10	.95128E	9
115.9	.59193E	10	.40201E	10	.27194E	10	.18336E	10	.12332E	10
140.2	.74818E	10	.51348E	10	.35071E	10	.23862E	10	.16125E	10
169.6	.95170E	10	.66140E	10	.45702E	10	.31434E	10	.21539E	10
205.1	.12182E	11	.85936E	10	.60210E	10	.41954E	10	.29102E	10
248.1	.15883E	11	.11261E	11	.80205E	10	.56757E	10	.39944E	10
300.0	.20280E	11	.14866E	11	.10796E	11	.77805E	10	.55720E	10

Table 16D

GRAPH OF ENERGY LEVELS VS. WC

MINI K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .12 18/CUBIC CENTIMETER
TEMPERATURE = 77.00DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

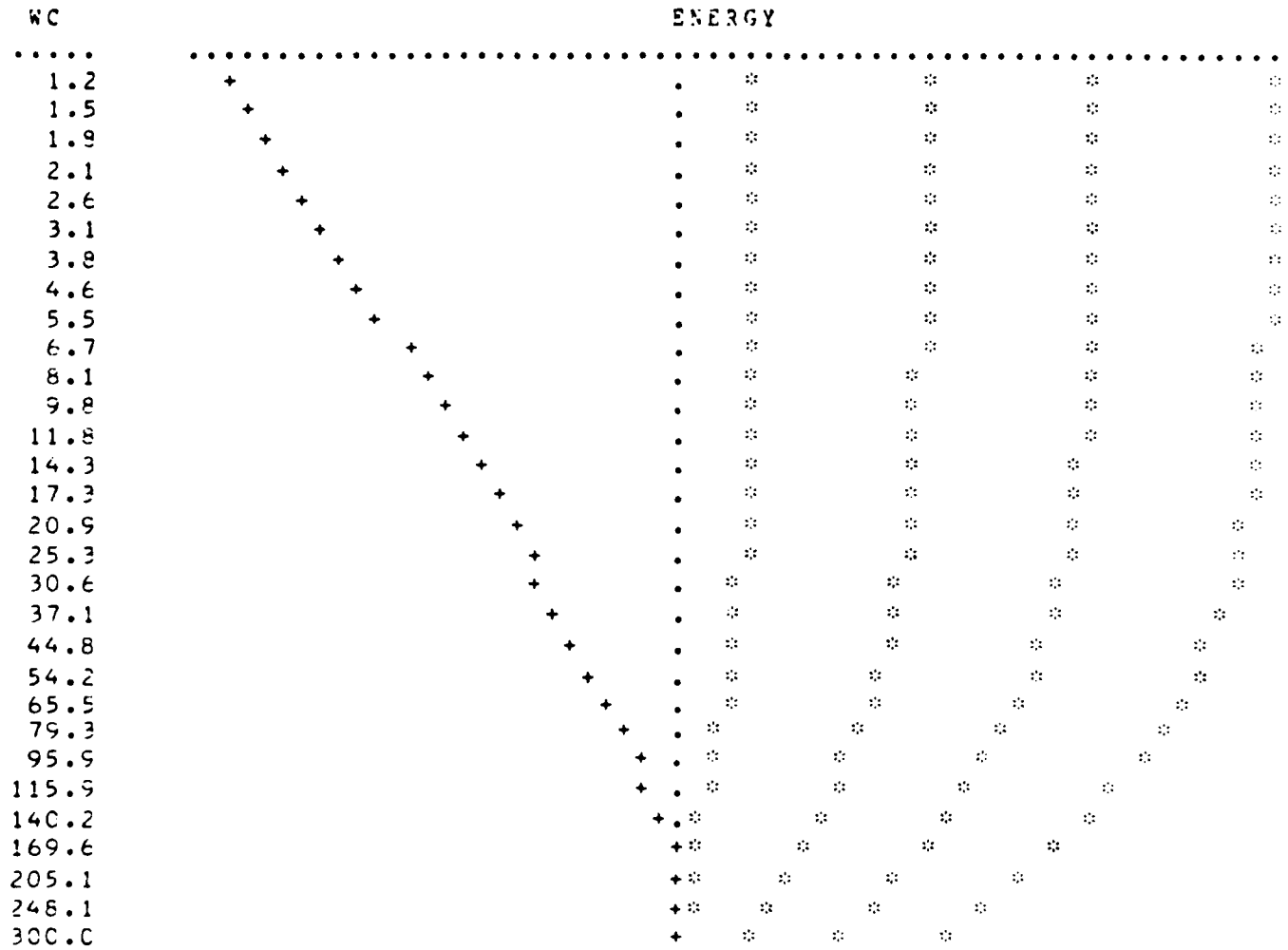


Figure 17

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-30.028	5.608	16.883	28.169	39.459	50.752
1.5	-28.775	5.599	16.866	28.147	39.433	50.722
1.8	-27.524	5.587	16.846	28.121	39.402	50.687
2.1	-26.275	5.573	16.822	28.089	39.365	50.645
2.6	-25.029	5.556	16.792	28.051	39.319	50.593
3.1	-23.786	5.535	16.756	28.005	39.265	50.531
3.8	-22.546	5.511	16.713	27.949	39.198	50.456
4.6	-21.311	5.481	16.661	27.882	39.119	50.365
5.5	-20.081	5.446	16.599	27.800	39.022	50.256
6.7	-18.858	5.403	16.523	27.703	38.906	50.124
8.1	-17.642	5.351	16.433	27.585	38.766	49.965
9.8	-16.435	5.290	16.323	27.443	38.597	49.773
11.8	-15.238	5.217	16.193	27.272	38.394	49.542
14.3	-14.054	5.130	16.036	27.067	38.150	49.264
17.3	-12.885	5.026	15.848	26.821	37.857	48.930
20.9	-11.732	4.904	15.624	26.527	37.506	48.529
25.3	-10.600	4.760	15.357	26.175	37.085	48.049
30.6	-9.490	4.592	15.041	25.756	36.583	47.475
37.1	-8.405	4.397	14.667	25.259	35.985	46.789
44.8	-7.350	4.173	14.228	24.671	35.275	45.974
54.2	-6.326	3.918	13.715	23.978	34.435	45.007
65.5	-5.337	3.633	13.121	23.167	33.447	43.865
79.3	-4.384	3.318	12.439	22.225	32.292	42.525
95.9	-3.471	2.977	11.665	21.139	30.950	40.961
115.9	-2.597	2.618	10.798	19.902	29.406	39.150
140.2	-1.765	2.250	9.844	18.509	27.649	37.073
169.6	-.977	1.886	8.815	16.968	25.675	34.719
205.1	-.233	1.538	7.733	15.293	23.493	32.088
248.1	.462	1.220	6.628	13.515	21.129	29.199
300.0	1.107	.942	5.538	11.680	18.628	26.092

Table 17A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	62.046	73.342	84.638	95.936	107.234
1.5	62.014	73.307	84.601	95.896	107.191
1.8	61.975	73.264	84.555	95.847	107.140
2.1	61.928	73.213	84.500	95.789	107.078
2.6	61.871	73.151	84.434	95.718	107.003
3.1	61.802	73.076	84.353	95.632	106.913
3.8	61.719	72.966	84.256	95.529	106.804
4.6	61.619	72.877	84.139	95.404	106.672
5.5	61.498	72.745	83.997	95.253	106.512
6.7	61.352	72.586	83.826	95.071	106.319
8.1	61.175	72.394	83.620	94.851	106.087
9.8	60.963	72.163	83.371	94.586	105.807
11.8	60.707	71.884	83.072	94.267	105.468
14.3	60.399	71.549	82.711	93.882	105.061
17.3	60.028	71.145	82.276	93.418	104.570
20.9	59.583	70.660	81.753	92.861	103.980
25.3	59.050	70.077	81.126	92.191	103.270
30.6	58.411	69.379	80.373	91.387	102.419
37.1	57.647	68.545	79.473	90.425	101.398
44.8	56.737	67.549	78.397	89.275	100.178
54.2	55.657	66.364	77.116	87.904	98.722
65.5	54.378	64.960	75.595	86.275	96.990
79.3	52.872	63.302	73.798	84.345	94.937
95.9	51.108	61.356	71.682	82.072	92.513
115.9	49.057	59.086	69.208	79.407	89.668
140.2	46.693	56.458	66.335	76.304	86.349
169.6	43.996	53.445	63.029	72.723	82.507
205.1	40.957	50.031	59.265	68.630	78.102
248.1	37.588	46.218	55.037	64.010	73.112
300.C	33.923	42.033	50.364	58.875	67.538

Table 17B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.98815E 9	.18089E 9	.33009E 8	.60178E 7	.10966E 7
1.5	.11947E 10	.21902E 9	.40000E 8	.72969E 7	.13304E 7
1.8	.14444E 10	.26526E 9	.48492E 8	.88527E 7	.16151E 7
2.1	.17460E 10	.32135E 9	.58617E 8	.10747E 8	.19622E 7
2.6	.21105E 10	.38945E 9	.71383E 8	.13057E 8	.23863E 7
3.1	.25508E 10	.47218E 9	.86697E 8	.15880E 8	.29052E 7
3.8	.30826E 10	.57277E 9	.10539E 9	.19334E 8	.35421E 7
4.6	.37245E 10	.69523E 9	.12825E 9	.23573E 8	.43257E 7
5.5	.44992E 10	.84451E 9	.15627E 9	.28790E 8	.52935E 7
6.7	.54337E 10	.10268E 10	.19070E 9	.35234E 8	.64938E 7
8.1	.65603E 10	.12497E 10	.23316E 9	.43225E 8	.79898E 7
9.8	.79175E 10	.15230E 10	.28571E 9	.53187E 8	.98657E 7
11.8	.95511E 10	.18590E 10	.35106E 9	.65680E 8	.12235E 8
14.3	.11515E 11	.22733E 10	.43277E 9	.81456E 8	.15251E 8
17.3	.13874E 11	.27861E 10	.53557E 9	.10155E 9	.19131E 8
20.9	.16701E 11	.34235E 10	.66589E 9	.12738E 9	.24178E 8
25.3	.20083E 11	.42197E 10	.83255E 9	.16098E 9	.30834E 8
30.6	.24117E 11	.52197E 10	.10478E 10	.20525E 9	.39748E 8
37.1	.28913E 11	.64835E 10	.13291E 10	.26447E 9	.51901E 8
44.8	.34590E 11	.80913E 10	.17015E 10	.34507E 9	.68812E 8
54.2	.41273E 11	.10151E 11	.22014E 10	.45688E 9	.92892E 8
65.5	.49081E 11	.12807E 11	.28832E 10	.61531E 9	.12807E 9
79.3	.58118E 11	.16253E 11	.38279E 10	.84502E 9	.18093E 9
95.9	.68452E 11	.20741E 11	.51583E 10	.11863E 10	.26282E 9
115.9	.80087E 11	.26590E 11	.70595E 10	.17058E 10	.39381E 9
140.2	.92932E 11	.34178E 11	.98081E 10	.25155E 10	.61025E 9
169.6	.10678E 12	.43907E 11	.13806E 11	.38036E 10	.97928E 9
205.1	.12130E 12	.56121E 11	.19608E 11	.58830E 10	.16262E 10
248.1	.13605E 12	.70979E 11	.27910E 11	.92570E 10	.27843E 10
300.0	.15055E 12	.88306E 11	.39450E 11	.14685E 11	.48780E 10

Table 17C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.19981E	6	.36413E	5	.66513E	4	.12309E	4	.24318E	3
1.5	.24251E	6	.44209E	5	.80732E	4	.14881E	4	.28944E	3
1.8	.29456E	6	.53721E	5	.98115E	4	.18082E	4	.34862E	3
2.1	.35811E	6	.65349E	5	.11936E	5	.21961E	4	.42071E	3
2.6	.43585E	6	.79589E	5	.14544E	5	.26712E	4	.50733E	3
3.1	.53117E	6	.97070E	5	.17751E	5	.32613E	4	.61278E	3
3.6	.64637E	6	.11863E	6	.21709E	5	.39876E	4	.74620E	3
4.6	.79297E	6	.14527E	6	.26615E	5	.48877E	4	.91460E	3
5.5	.97209E	6	.17837E	6	.32721E	5	.60148E	4	.11190E	4
6.7	.11950E	7	.21970E	6	.40371E	5	.74281E	4	.13632E	4
8.1	.14741E	7	.27164E	6	.50020E	5	.92191E	4	.17124E	4
9.8	.18259E	7	.33742E	6	.62294E	5	.11504E	5	.21369E	4
11.8	.22729E	7	.42146E	6	.78050E	5	.14453E	5	.26900E	4
14.3	.28463E	7	.52997E	6	.98518E	5	.18303E	5	.34098E	4
17.3	.35901E	7	.67183E	6	.12547E	6	.23405E	5	.43755E	4
20.9	.45676E	7	.85997E	6	.16150E	6	.30281E	5	.56829E	4
25.3	.58721E	7	.11137E	7	.21058E	6	.39729E	5	.74959E	4
30.6	.76438E	7	.14627E	7	.27883E	6	.53007E	5	.10067E	5
37.1	.10099E	8	.19534E	7	.37610E	6	.72160E	5	.13817E	5
44.6	.13582E	8	.26614E	7	.51860E	6	.10061E	6	.19464E	5
54.2	.18653E	8	.37128E	7	.73405E	6	.14436E	6	.28276E	5
65.5	.26257E	8	.53262E	7	.10717E	7	.21423E	6	.42607E	5
79.3	.38037E	8	.78941E	7	.16223E	7	.33078E	6	.67019E	5
95.9	.56948E	8	.12149E	8	.25612E	7	.53484E	6	.11082E	6
115.9	.88494E	8	.19516E	8	.42426E	7	.91179E	6	.19412E	6
140.2	.14326E	9	.32878E	8	.74164E	7	.16500E	7	.36294E	6
169.6	.24220E	9	.58315E	8	.13750E	8	.31888E	7	.72948E	6
205.1	.42825E	9	.10912E	9	.27127E	8	.66113E	7	.15852E	7
248.1	.78969E	9	.21528E	9	.56983E	8	.14733E	8	.37356E	7
300.0	.15098E	10	.44565E	9	.12702E	9	.35210E	8	.95392E	7

Table 17D

GRAPH OF ENERGY LEVELS VS. WC

NINP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .5F 18/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

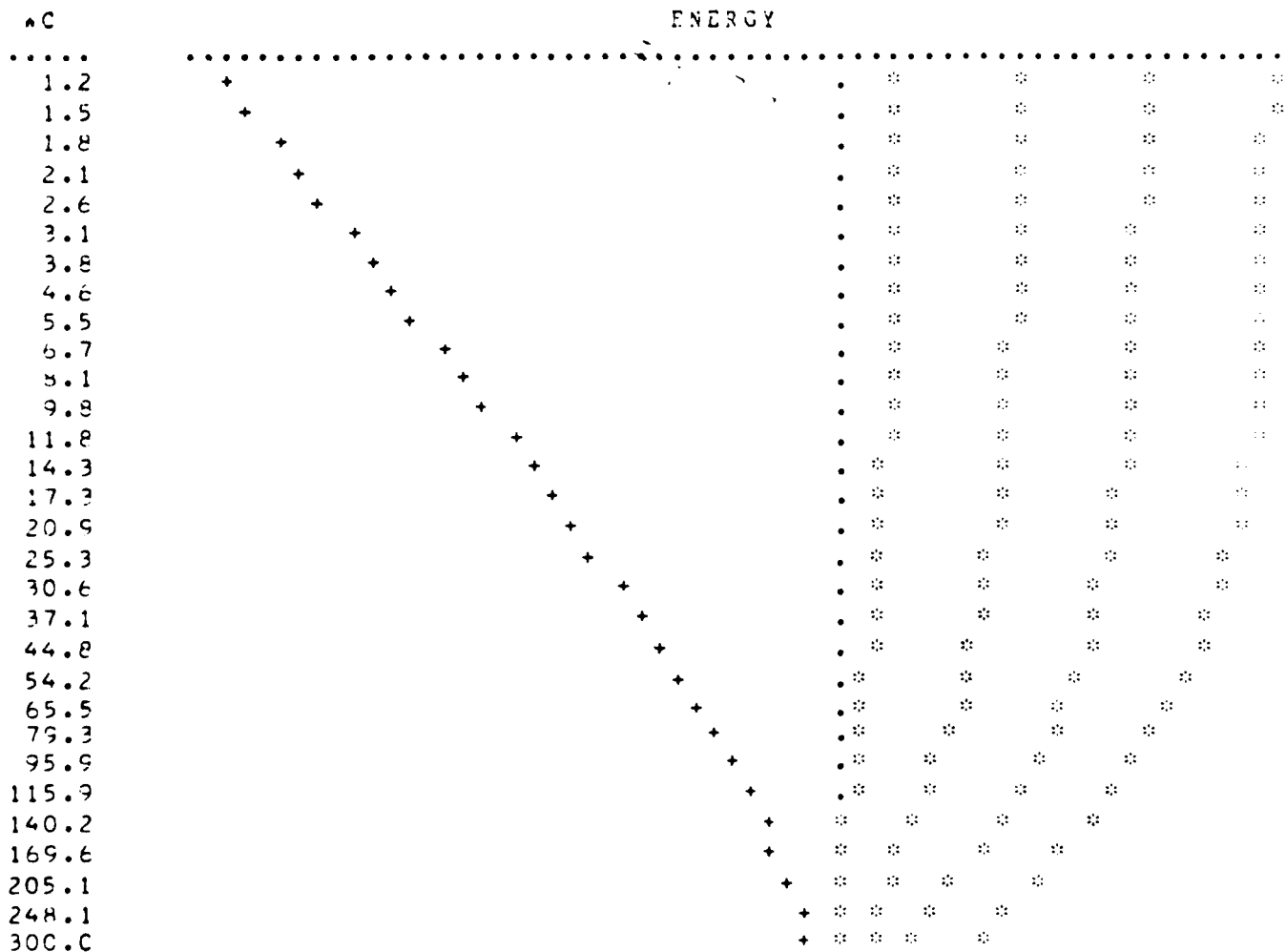


Figure 18

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-126.940	12.489	37.663	62.873	88.097	113.330
1.5	-122.063	12.457	37.607	62.800	88.011	113.233
1.8	-117.192	12.418	37.540	62.713	87.908	113.115
2.1	-112.331	12.372	37.458	62.607	87.782	112.973
2.6	-107.480	12.315	37.360	62.480	87.631	112.801
3.1	-102.643	12.248	37.241	62.326	87.449	112.594
3.8	-97.820	12.166	37.098	62.140	87.229	112.344
4.6	-93.017	12.069	36.925	61.917	86.963	112.043
5.5	-88.235	11.952	36.718	61.647	86.643	111.679
6.7	-83.480	11.811	36.469	61.323	86.258	111.241
8.1	-78.757	11.644	36.170	60.933	85.794	110.713
9.8	-74.071	11.445	35.812	60.465	85.237	110.078
11.8	-69.430	11.209	35.383	59.903	84.567	109.315
14.3	-64.841	10.931	34.872	59.231	83.765	108.400
17.3	-60.314	10.603	34.263	58.429	82.804	107.303
20.9	-55.858	10.221	33.542	57.473	81.658	105.992
25.3	-51.485	9.777	32.690	56.339	80.293	104.428
30.6	-47.207	9.269	31.690	54.998	78.674	102.567
37.1	-43.037	8.691	30.524	53.420	76.760	100.363
44.8	-38.988	8.044	29.173	51.574	74.510	97.762
54.2	-35.073	7.333	27.624	49.431	71.880	94.709
65.5	-31.306	6.566	25.868	46.965	68.829	91.150
79.3	-27.698	5.760	23.906	44.158	65.323	87.034
95.9	-24.262	4.936	21.752	41.004	61.337	82.319
115.9	-21.008	4.124	19.435	37.519	56.867	76.982
140.2	-17.946	3.353	17.006	33.743	51.938	71.029
169.6	-15.085	2.651	14.535	29.748	46.610	64.506
205.1	-12.430	2.041	12.107	25.638	40.989	57.510
248.1	-9.982	1.532	9.513	21.550	35.229	50.198
300.0	-7.732	1.126	7.736	17.633	29.522	42.786

Table 18A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	138.569	163.811	189.058	214.307	239.558
1.5	138.461	163.694	188.932	214.173	239.416
1.8	138.331	163.553	188.780	214.011	239.245
2.1	138.174	163.382	188.596	213.815	239.039
2.6	137.984	163.176	188.375	213.579	238.789
3.1	137.755	162.926	188.107	213.294	238.487
3.8	137.478	162.625	187.783	212.949	238.122
4.6	137.144	162.262	187.392	212.533	237.682
5.5	136.741	161.824	186.921	212.031	237.151
6.7	136.256	161.295	186.353	211.425	236.510
8.1	135.671	160.658	185.668	210.695	235.737
9.8	134.967	159.891	184.842	209.815	234.806
11.8	134.121	158.969	183.849	208.756	233.685
14.3	133.105	157.860	182.655	207.483	232.336
17.3	131.886	156.530	181.222	205.953	230.715
20.9	130.427	154.936	179.504	204.118	228.770
25.3	128.684	153.031	177.448	201.921	226.440
30.6	126.608	150.758	174.993	199.296	223.655
37.1	124.144	148.056	172.070	196.167	220.332
44.8	121.229	144.854	168.603	192.451	216.381
54.2	117.797	141.077	164.505	188.052	211.699
65.5	113.782	136.645	159.686	182.872	206.177
79.3	109.118	131.479	154.055	176.804	199.698
95.9	103.747	125.505	147.522	169.747	192.145
115.9	97.627	118.665	140.012	161.608	183.412
140.2	90.745	110.927	131.475	152.320	173.412
169.6	83.129	102.300	121.901	141.854	162.100
205.1	74.864	92.852	111.342	130.243	149.489
248.1	66.103	82.728	99.928	117.604	135.678
300.0	57.071	72.156	87.887	104.155	120.879

Table 18B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.37634E 10	.14228E 10	.53668E 9	.20226E 9	.76189E 8
1.5	.45487E 10	.17218E 10	.64994E 9	.24508E 9	.92362E 8
1.8	.54972E 10	.20838E 10	.78733E 9	.29708E 9	.11202E 9
2.1	.66424E 10	.25224E 10	.95408E 9	.36030E 9	.13595E 9
2.6	.80246E 10	.30539E 10	.11566E 10	.43722E 9	.16511E 9
3.1	.96923E 10	.36981E 10	.14029E 10	.53094E 9	.20070E 9
3.8	.11703E 11	.44793E 10	.17025E 10	.64528E 9	.24422E 9
4.6	.14127E 11	.54274E 10	.20677E 10	.78506E 9	.29755E 9
5.5	.17045E 11	.65785E 10	.25133E 10	.95629E 9	.36309E 9
6.7	.20556E 11	.79773E 10	.30582E 10	.11666E 10	.44388E 9
8.1	.24775E 11	.96786E 10	.37258E 10	.14257E 10	.54385E 9
9.8	.29639E 11	.11750E 11	.45459E 10	.17460E 10	.66813E 9
11.8	.35904E 11	.14275E 11	.55563E 10	.21439E 10	.82345E 9
14.3	.43155E 11	.17357E 11	.68057E 10	.26404E 10	.10188E 10
17.3	.51802E 11	.21125E 11	.83567E 10	.32638E 10	.12663E 10
20.9	.62078E 11	.25739E 11	.10291E 11	.40520E 10	.15826E 10
25.3	.74242E 11	.31398E 11	.12717E 11	.50563E 10	.19909E 10
30.6	.88571E 11	.38351E 11	.15777E 11	.63475E 10	.25239E 10
37.1	.10535E 12	.46904E 11	.19661E 11	.80243E 10	.32286E 10
44.8	.12483E 12	.57435E 11	.24624E 11	.10226E 11	.41737E 10
54.2	.14725E 12	.70399E 11	.31009E 11	.13150E 11	.54610E 10
65.5	.17273E 12	.86329E 11	.39271E 11	.17079E 11	.72431E 10
79.3	.20129E 12	.10582E 12	.50008E 11	.22419E 11	.97515E 10
95.9	.23272E 12	.12948E 12	.63986E 11	.29745E 11	.13339E 11
115.9	.26661E 12	.15783E 12	.82135E 11	.39862E 11	.18541E 11
140.2	.30230E 12	.19118E 12	.10549E 12	.53848E 11	.26159E 11
169.6	.33394E 12	.22943E 12	.13507E 12	.73065E 11	.37358E 11
205.1	.37560E 12	.27190E 12	.17155E 12	.99052E 11	.53734E 11
248.1	.41144E 12	.31734E 12	.21500E 12	.13325E 12	.77274E 11
300.0	.44586E 12	.36403E 12	.26455E 12	.17650E 12	.11007E 12

Table 18C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.28692E	8	.10803E	8	.40671E	7	.15310E	7	.57634E	6
1.5	.34797E	8	.13107E	8	.49360E	7	.18567E	7	.69986E	6
1.8	.42225E	8	.15912E	8	.59947E	7	.22582E	7	.85060E	6
2.1	.51275E	8	.19332E	8	.72871E	7	.27463E	7	.10349E	7
2.6	.62317E	8	.23511E	8	.88674E	7	.33437E	7	.12607E	7
3.1	.75815E	8	.28626E	8	.10804E	8	.40769E	7	.15380E	7
3.8	.92351E	8	.34902E	8	.13185E	8	.49792E	7	.18799E	7
4.6	.11266E	9	.42627E	8	.16120E	8	.60936E	7	.23028E	7
5.5	.13769E	9	.52167E	8	.19753E	8	.74760E	7	.28283E	7
6.7	.16864E	9	.64001E	8	.24272E	8	.91993E	7	.34850E	7
8.1	.20708E	9	.78752E	8	.29922E	8	.11361E	8	.43108E	7
9.8	.25510E	9	.97250E	8	.37034E	8	.14091E	8	.53574E	7
11.8	.31543E	9	.12061E	9	.46055E	8	.17568E	8	.66956E	7
14.3	.39182E	9	.15036E	9	.57604E	8	.22041E	8	.84251E	7
17.3	.48936E	9	.18860E	9	.72547E	8	.27863E	8	.10688E	8
20.9	.61516E	9	.23834E	9	.92124E	8	.35542E	8	.13692E	8
25.3	.77933E	9	.30387E	9	.11814E	9	.45830E	8	.17746E	8
30.6	.99642E	9	.39152E	9	.15330E	9	.59863E	8	.23324E	8
37.1	.12879E	10	.51076E	9	.20171E	9	.79398E	8	.31169E	8
44.8	.16858E	10	.67614E	9	.26980E	9	.10723E	9	.42479E	8
54.2	.22393E	10	.91041E	9	.36785E	9	.14791E	9	.59241E	8
65.5	.30247E	10	.12501E	10	.51276E	9	.20910E	9	.84866E	8
79.3	.41629E	10	.17549E	10	.73304E	9	.30404E	9	.12538E	9
95.9	.58476E	10	.25246E	10	.10779E	10	.45628E	9	.19182E	9
115.9	.83916E	10	.37282E	10	.16342E	10	.70896E	9	.30501E	9
140.2	.12301E	11	.56559E	10	.25585E	10	.11430E	10	.50554E	9
169.6	.18382E	11	.88052E	10	.41357E	10	.19135E	10	.87469E	9
205.1	.27888E	11	.14020E	11	.68849E	10	.33204E	10	.15784E	10
248.1	.42648E	11	.22686E	11	.11737E	11	.59436E	10	.29586E	10
300.0	.65098E	11	.36940E	11	.20301E	11	.10879E	11	.57132E	10

Table 18D

GRAPH OF ENERGY LEVELS VS. WC

NINP K1 = K2 = K3 = 0.077 EL = 14.0

DONOR CONCENTRATION = .5E 18/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

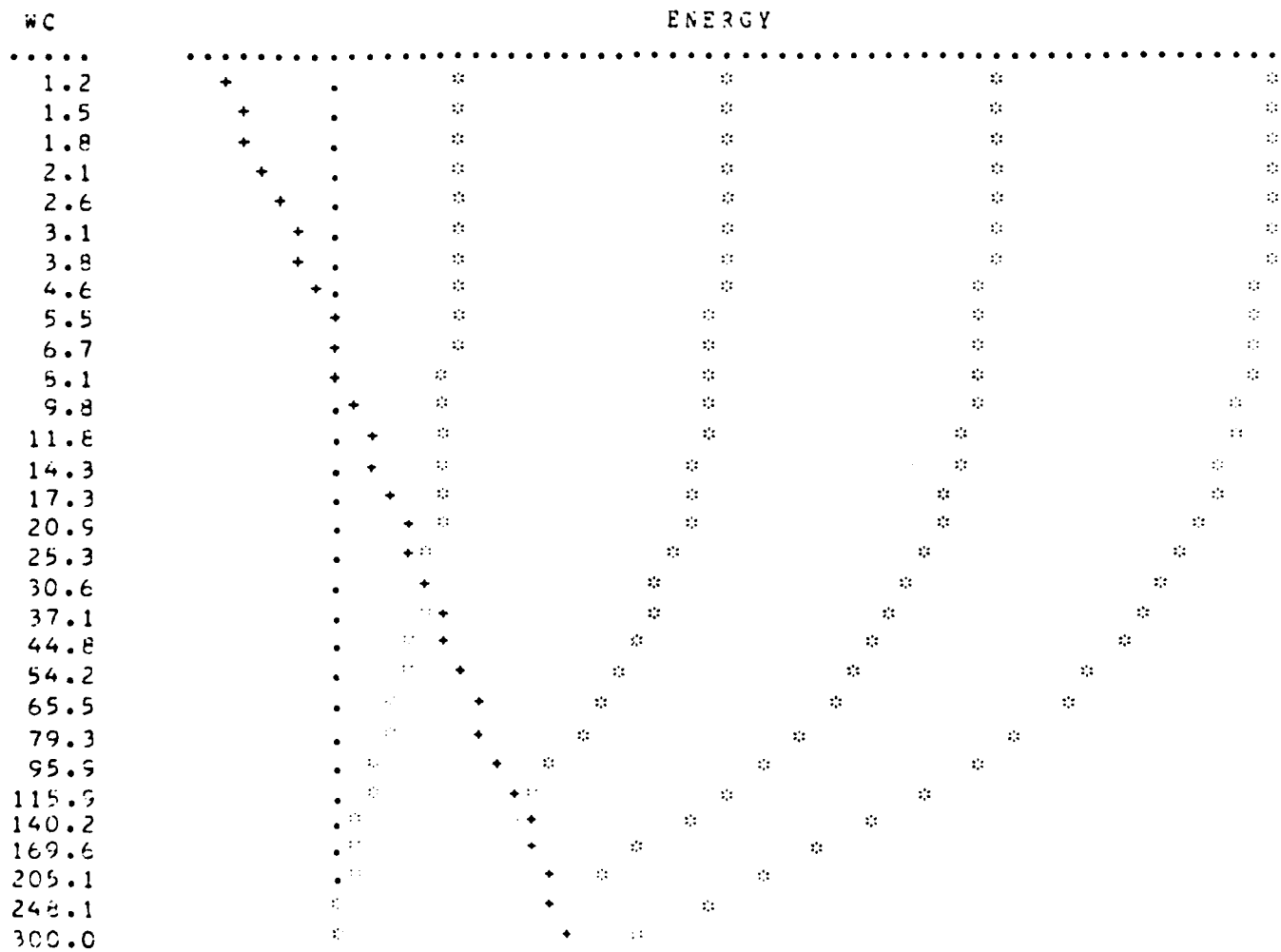


Figure 19

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-11.207	12.489	37.663	62.873	88.097	113.336
1.5	-9.960	12.457	37.607	62.800	88.011	113.233
1.8	-8.715	12.418	37.540	62.713	87.908	113.115
2.1	-7.474	12.372	37.458	62.607	87.782	112.973
2.6	-6.237	12.315	37.360	62.480	87.631	112.801
3.1	-5.004	12.248	37.241	62.326	87.449	112.594
3.8	-3.777	12.166	37.098	62.140	87.229	112.344
4.6	-2.556	12.069	36.925	61.917	86.963	112.043
5.5	-1.342	11.952	36.718	61.647	86.643	111.679
6.7	-0.137	11.811	36.469	61.323	86.258	111.241
8.1	1.059	11.644	36.170	60.933	85.794	110.713
9.8	2.245	11.445	35.812	60.465	85.237	110.078
11.8	3.420	11.209	35.383	59.903	84.567	109.315
14.3	4.583	10.931	34.872	59.231	83.765	108.400
17.3	5.736	10.603	34.263	58.429	82.804	107.303
20.9	6.878	10.221	33.542	57.473	81.658	105.992
25.3	8.015	9.777	32.690	56.339	80.293	104.428
30.6	9.148	9.269	31.690	54.998	78.674	102.567
37.1	10.286	8.691	30.524	53.420	76.760	100.363
44.8	11.436	8.044	29.173	51.574	74.510	97.762
54.2	12.603	7.333	27.624	49.431	71.880	94.709
65.5	13.790	6.566	25.868	46.965	68.829	91.150
79.3	14.988	5.760	23.906	44.158	65.323	87.034
95.9	16.178	4.936	21.752	41.004	61.337	82.319
115.9	17.340	4.124	19.435	37.519	56.867	76.982
140.2	18.462	3.353	17.006	33.743	51.938	71.029
169.6	19.542	2.651	14.535	29.748	46.610	64.506
205.1	20.571	2.041	12.107	25.634	40.949	57.510
248.1	21.532	1.532	9.813	21.550	35.229	50.195
300.0	22.419	1.126	7.736	17.633	29.522	42.786

Table 19A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	138.569	163.811	189.058	214.307	239.554
1.5	138.461	163.694	188.932	214.173	239.416
1.8	138.331	163.553	188.780	214.011	239.245
2.1	138.174	163.382	188.596	213.815	239.039
2.6	137.984	163.176	188.375	213.579	238.789
3.1	137.755	162.926	188.107	213.294	238.487
3.8	137.478	162.625	187.783	212.949	238.122
4.6	137.144	162.262	187.392	212.533	237.682
5.5	136.741	161.824	186.921	212.031	237.151
6.7	136.256	161.295	186.353	211.425	236.510
8.1	135.671	160.658	185.668	210.695	235.737
9.8	134.967	159.891	184.842	209.815	234.806
11.8	134.121	158.969	183.849	208.756	233.655
14.3	133.105	157.860	182.655	207.483	232.336
17.3	131.886	156.530	181.222	205.953	230.715
20.9	130.427	154.936	179.504	204.118	228.770
25.3	128.684	153.031	177.448	201.921	226.440
30.6	126.608	150.758	174.993	199.296	223.655
37.1	124.144	148.056	172.070	196.167	220.332
44.8	121.229	144.854	168.603	192.451	216.361
54.2	117.797	141.077	164.505	188.012	211.699
65.5	113.782	136.645	159.686	182.872	206.177
79.3	109.118	131.479	154.055	176.804	199.698
95.9	103.747	125.505	147.522	169.747	192.145
115.7	97.627	118.665	140.012	161.608	183.412
140.2	90.745	110.927	131.475	152.320	173.412
169.6	83.129	102.300	121.901	141.854	162.100
205.1	74.864	92.852	111.342	130.243	149.489
248.1	66.103	82.728	99.928	117.604	135.679
300.0	57.071	72.156	87.887	104.155	120.879

Table 19B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.59093E 10	.13463E 9	.30109E 7	.67186E 5	.15128E 4
1.5	.71457E 10	.16385E 9	.36737E 7	.82135E 5	.18545E 4
1.8	.86404E 10	.19968E 9	.44907E 7	.10064E 6	.22736E 4
2.1	.10447E 11	.24372E 9	.55016E 7	.12366E 6	.27949E 4
2.6	.12632E 11	.29806E 9	.67585E 7	.15245E 6	.34507E 4
3.1	.15272E 11	.36536E 9	.83206E 7	.18870E 6	.42425E 4
3.8	.18462E 11	.44912E 9	.10307E 8	.23471E 6	.53450E 4
4.6	.22317E 11	.55396E 9	.12815E 8	.29365E 6	.67169E 4
5.5	.26974E 11	.68609E 9	.16026E 8	.37004E 6	.85149E 4
6.7	.32597E 11	.85398E 9	.20183E 8	.47032E 6	.10902E 5
8.1	.39385E 11	.10693E 10	.25034E 8	.60404E 6	.14131E 5
9.8	.47575E 11	.13488E 10	.32893E 8	.78561E 6	.18589E 5
11.8	.57449E 11	.17161E 10	.42734E 8	.10374E 7	.24885E 5
14.3	.69343E 11	.22065E 10	.56355E 8	.13953E 7	.34038E 5
17.3	.83652E 11	.28729E 10	.75668E 8	.19187E 7	.47770E 5
20.9	.10083E 12	.37970E 10	.10382E 9	.27095E 7	.69148E 5
25.3	.12141E 12	.51078E 10	.14619E 9	.39504E 7	.10388E 6
30.6	.14596E 12	.70145E 10	.21228E 9	.59829E 7	.16314E 6
37.1	.17508E 12	.98622E 10	.31961E 9	.94780E 7	.27000E 6
44.8	.20932E 12	.14229E 11	.50181E 9	.15823E 8	.47524E 6
54.2	.24905E 12	.21085E 11	.82594E 9	.28048E 8	.89783E 6
65.5	.29424E 12	.32010E 11	.14305E 10	.53126E 8	.18361E 7
79.3	.34423E 12	.49419E 11	.26094E 10	.10797E 9	.40913E 7
95.0	.39757E 12	.76550E 11	.49948E 10	.23551E 9	.99661E 7
115.9	.45238E 12	.11874E 12	.99469E 10	.55014E 9	.26546E 8
140.2	.50681E 12	.17258E 12	.20310E 11	.13678E 10	.77117E 8
169.6	.55939E 12	.24326E 12	.41491E 11	.30743E 10	.24256E 9
205.1	.60870E 12	.32477E 12	.81586E 11	.90005E 10	.81222E 9
248.1	.65351E 12	.41061E 12	.14760E 12	.20473E 11	.28140E 10
300.0	.69334E 12	.49440E 12	.23844E 12	.40000E 11	.96757E 10

Table 19C

ELECTRON CONCENTRATION/ SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.57028E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
1.5	.63484E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
1.8	.73168E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
2.1	.85004E	2	.23134E	2	.23134E	2	.23134E	2	.23134E	2
2.6	.10061E	3	.25824E	2	.23134E	2	.23134E	2	.23134E	2
3.1	.11944E	3	.25824E	2	.23134E	2	.23134E	2	.23134E	2
3.8	.14418E	3	.25824E	2	.23134E	2	.23134E	2	.23134E	2
4.6	.17539E	3	.25824E	2	.23134E	2	.23134E	2	.23134E	2
5.5	.21343E	3	.25824E	2	.23134E	2	.23134E	2	.23134E	2
6.7	.27438E	3	.29052E	2	.23134E	2	.23134E	2	.23134E	2
8.1	.35239E	3	.29052E	2	.23134E	2	.23134E	2	.23134E	2
9.8	.45730E	3	.31742E	2	.23134E	2	.23134E	2	.23134E	2
11.8	.61278E	3	.35508E	2	.23134E	2	.23134E	2	.23134E	2
14.3	.84251E	3	.41964E	2	.23134E	2	.23134E	2	.23134E	2
17.3	.11965E	4	.51648E	2	.23134E	2	.23134E	2	.23134E	2
20.9	.17587E	4	.66174E	2	.23134E	2	.23134E	2	.23134E	2
25.3	.27024E	4	.91460E	2	.25824E	2	.23134E	2	.23134E	2
30.6	.43729E	4	.13773E	3	.25824E	2	.23134E	2	.23134E	2
37.1	.75083E	4	.22811E	3	.29052E	2	.23134E	2	.23134E	2
44.8	.13839E	5	.41426E	3	.35508E	2	.23134E	2	.23134E	2
54.2	.27657E	5	.84842E	3	.47882E	2	.23134E	2	.23134E	2
65.5	.60564E	5	.19508E	4	.81776E	2	.25824E	2	.23134E	2
79.3	.14654E	6	.50561E	4	.19045E	3	.29052E	2	.23134E	2
95.9	.39406E	6	.14844E	5	.56006E	3	.41964E	2	.23134E	2
115.9	.11812E	7	.49545E	5	.20035E	4	.10061E	3	.25824E	2
140.2	.39477E	7	.18935E	6	.85235E	4	.38951E	3	.38736E	2
169.6	.14645E	8	.31378E	6	.42396E	5	.21154E	4	.12213E	3
205.1	.59450E	8	.39487E	7	.24314E	6	.14093E	5	.79570E	3
249.1	.25737E	9	.21003E	8	.15706E	7	.10937E	6	.71887E	4
300.0	.11456E	10	.11815E	9	.11029E	8	.94929E	6	.76299E	5

Table 19D

GRAPH OF ENERGY LEVELS VS. WC

NINSb K1 = K2 = K3 = 0.013 EL = 17.0

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

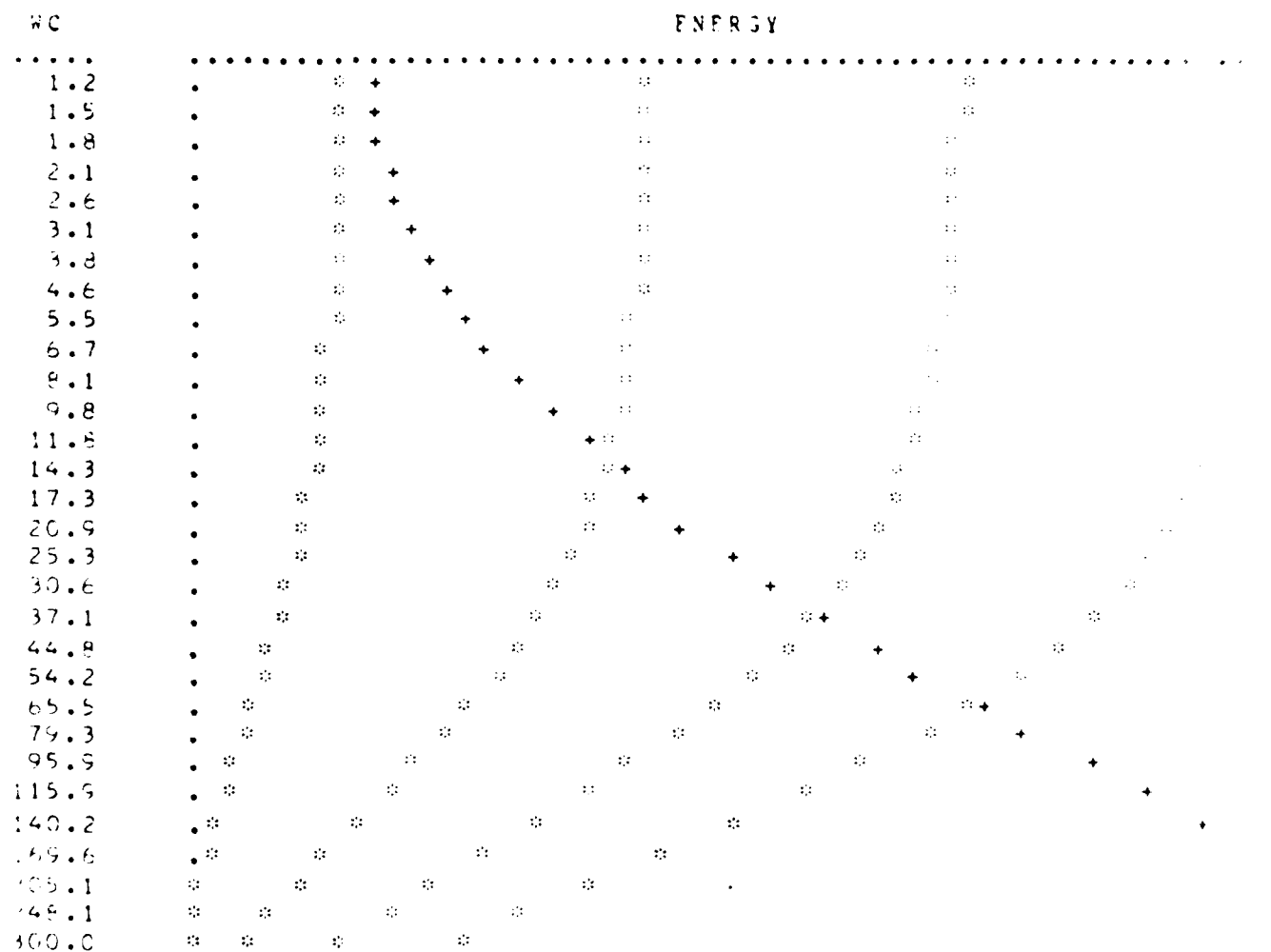


Figure 20

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	144.952	122.916	371.234	620.005	868.962	1118.030
1.5	149.327	.000	370.521	619.062	867.870	1116.790
1.8	154.541	122.016	369.661	617.969	866.551	1115.293
2.1	160.801	121.423	368.624	616.625	864.958	1113.485
2.6	168.350	.000	367.373	615.004	863.035	1111.302
3.1	177.475	119.854	365.866	613.049	860.716	1108.667
3.8	188.514	118.827	364.052	610.693	857.919	1105.490
4.6	201.877	.000	361.870	607.855	854.549	1101.659
5.5	218.054	116.125	359.249	604.442	850.491	1097.044
6.7	237.644	114.371	356.104	600.339	845.609	1091.489
8.1	261.372	112.286	352.338	595.414	839.743	1084.808
9.8	290.120	109.816	347.837	589.513	832.703	1076.783
11.8	324.536	106.904	342.473	582.456	824.269	1067.157
14.3	351.337	103.489	336.097	574.035	814.184	1055.633
17.3	373.500	99.511	328.550	564.017	802.155	1041.864
20.9	400.153	94.915	319.655	552.140	787.849	1025.456
25.3	432.699	89.657	309.231	538.120	770.897	1005.965
30.6	472.504	83.716	297.099	521.657	750.897	982.900
37.1	514.670	77.102	283.095	502.447	727.427	955.735
44.8	547.467	69.672	267.096	480.206	700.063	923.921
54.2	587.973	62.141	249.046	454.701	668.415	886.924
65.5	636.302	54.089	228.988	425.792	632.166	844.266
79.3	674.369	45.960	207.112	393.469	591.141	795.591
95.9	722.566	38.043	183.781	358.017	545.384	740.758
115.9	764.081	30.635	159.560	319.876	495.243	679.945
140.2	811.626	23.999	135.199	279.891	441.486	613.767
169.6	855.121	18.310	111.574	239.212	385.305	543.385
205.1	897.440	13.640	89.573	199.245	328.365	470.556
248.1	939.334	9.954	69.958	161.488	272.660	397.584
300.0	980.094	7.142	53.226	127.312	220.287	327.119

Table 20A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	1367.172	1616.370	1865.610	2114.884	2364.187
1.5	1365.801	1614.878	1864.007	2113.178	2362.382
1.8	1364.145	1613.077	1862.071	2111.116	2360.202
2.1	1362.144	1610.900	1859.732	2108.625	2357.568
2.6	1359.728	1608.272	1856.907	2105.616	2354.386
3.1	1356.812	1605.099	1853.497	2101.983	2350.543
3.8	1353.294	1601.271	1849.381	2097.598	2345.904
4.6	1349.052	1596.652	1844.415	2092.307	2340.306
5.5	1343.939	1591.065	1838.427	2085.925	2333.554
6.7	1337.781	1584.378	1831.211	2078.234	2325.414
8.1	1330.372	1576.304	1822.522	2068.970	2315.608
9.8	1321.466	1566.595	1812.069	2057.821	2303.803
11.8	1310.777	1554.934	1799.508	2044.419	2289.608
14.3	1297.965	1540.947	1784.434	2028.328	2272.558
17.3	1282.640	1524.202	1766.375	2009.038	2252.109
20.9	1264.352	1504.198	1744.781	1985.958	2227.627
25.3	1242.590	1480.361	1719.024	1958.404	2196.379
30.6	1216.782	1452.049	1688.392	1925.602	2163.529
37.1	1186.307	1418.551	1652.093	1886.681	2122.136
44.8	1150.505	1379.103	1609.265	1840.690	2073.160
54.2	1108.709	1332.915	1559.005	1786.616	2015.487
65.5	1060.288	1279.216	1500.407	1723.426	1947.961
79.3	1004.719	1217.319	1432.630	1650.132	1869.455
95.9	941.674	1146.720	1354.997	1565.892	1778.965
115.9	871.147	1067.225	1267.131	1470.147	1675.755
140.2	793.591	979.109	1169.122	1362.801	1559.544
169.6	710.060	883.288	1061.727	1244.438	1430.736
205.1	622.313	781.463	946.550	1116.540	1290.668
248.1	532.832	676.203	826.178	981.663	1141.834
300.0	444.676	570.855	704.161	843.487	987.986

Table 20B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.12094E 12	.39057E 1	.39057E 1	.39057E 1	.39057E 1
1.5	.14627E 12	.39057E 1	.39057E 1	.39057E 1	.39057E 1
1.8	.17689E 12	.39057E 1	.39057E 1	.39057E 1	.39057E 1
2.1	.21394E 12	.39057E 1	.39057E 1	.39057E 1	.39057E 1
2.6	.25873E 12	.39057E 1	.39057E 1	.39057E 1	.39057E 1
3.1	.31291E 12	.39057E 1	.39057E 1	.39057E 1	.39057E 1
3.8	.37844E 12	.39057E 1	.39057E 1	.39057E 1	.39057E 1
4.6	.45768E 12	.49049E 1	.39057E 1	.39057E 1	.39057E 1
5.5	.55352E 12	.24343E 2	.39057E 1	.39057E 1	.39057E 1
6.7	.66943E 12	.63554E 3	.39057E 1	.39057E 1	.39057E 1
8.1	.80961E 12	.39865E 5	.39057E 1	.39057E 1	.39057E 1
9.8	.97914E 12	.59906E 7	.39057E 1	.39057E 1	.39057E 1
11.8	.11819E 13	.23334E 10	.39057E 1	.39057E 1	.39057E 1
14.3	.13459E 13	.86211E 11	.39057E 1	.39057E 1	.39057E 1
17.3	.14879E 13	.24415E 12	.39057E 1	.39057E 1	.39057E 1
20.9	.16576E 13	.43715E 12	.80840E 1	.39057E 1	.39057E 1
25.3	.18629E 13	.67049E 12	.45128E 4	.39057E 1	.39057E 1
30.6	.21113E 13	.95254E 12	.21785E 8	.39057E 1	.39057E 1
37.1	.23762E 13	.12576E 13	.71677E 11	.39057E 1	.39057E 1
44.8	.25936E 13	.15226E 13	.36526E 12	.75390E 1	.39057E 1
54.2	.28555E 13	.18405E 13	.72374E 12	.19481E 6	.39057E 1
65.5	.31617E 13	.22119E 13	.11432E 13	.37923E 11	.39057E 1
79.3	.34126E 13	.25374E 13	.15253E 13	.45197E 12	.42009E 3
95.9	.37173E 13	.29259E 13	.19797E 13	.96219E 12	.22479E 10
115.9	.39830E 13	.32829E 13	.24123E 13	.14599E 13	.45691E 12
140.2	.42772E 13	.36733E 13	.28876E 13	.20100E 13	.10745E 13
169.6	.45443E 13	.40378E 13	.33447E 13	.25513E 13	.16929E 13
205.1	.47995E 13	.43871E 13	.37916E 13	.30904E 13	.23182E 13
248.1	.50470E 13	.47212E 13	.42241E 13	.36204E 13	.29420E 13
300.0	.52836E 13	.50334E 13	.46310E 13	.41261E 13	.35460E 13

Table 20C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
1.5	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
1.8	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
2.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
2.6	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
3.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
3.8	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
4.6	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
5.5	.39057E	1	.00000E	0	.00000E	0	.00000E	0	.00000E	0
6.7	.39057E	1	.00000E	0	.00000E	0	.00000E	0	.00000E	0
8.1	.39057E	1	.00000E	0	.00000E	0	.00000E	0	.00000E	0
9.8	.39057E	1	.00000E	0	.00000E	0	.00000E	0	.00000E	0
11.8	.39057E	1	.00000E	0	.00000E	0	.00000E	0	.00000E	0
14.3	.39057E	1	.00000E	0	.00000E	0	.00000E	0	.00000E	0
17.3	.39057E	1	.00000E	0	.00000E	0	.00000E	0	.00000E	0
20.9	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E	0
25.3	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E	0
30.6	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E	0
37.1	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E	0
44.8	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E	0
54.2	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E	0
65.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.00000E	0
79.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.00000E	0
95.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
115.9	.35226E	4	.39057E	1	.39057E	1	.39057E	1	.39057E	1
140.2	.10024E	12	.43599E	1	.39057E	1	.39057E	1	.39057E	1
169.6	.78776E	12	.51195E	9	.39057E	1	.39057E	1	.39057E	1
205.1	.14941E	13	.62981E	12	.21925E	8	.39057E	1	.39057E	1
249.1	.22075E	13	.14289E	13	.61450E	12	.60913E	8	.39057E	1
300.0	.29076E	13	.22224E	13	.14985E	13	.74185E	12	.95689E	10

Table 20D

GRAPH OF ENERGY LEVELS VS. WC

NINSB K1 = K2 = K3 = 0.013 EL = 17.0
 DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER
 TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
 WC IN ANGSTROMS

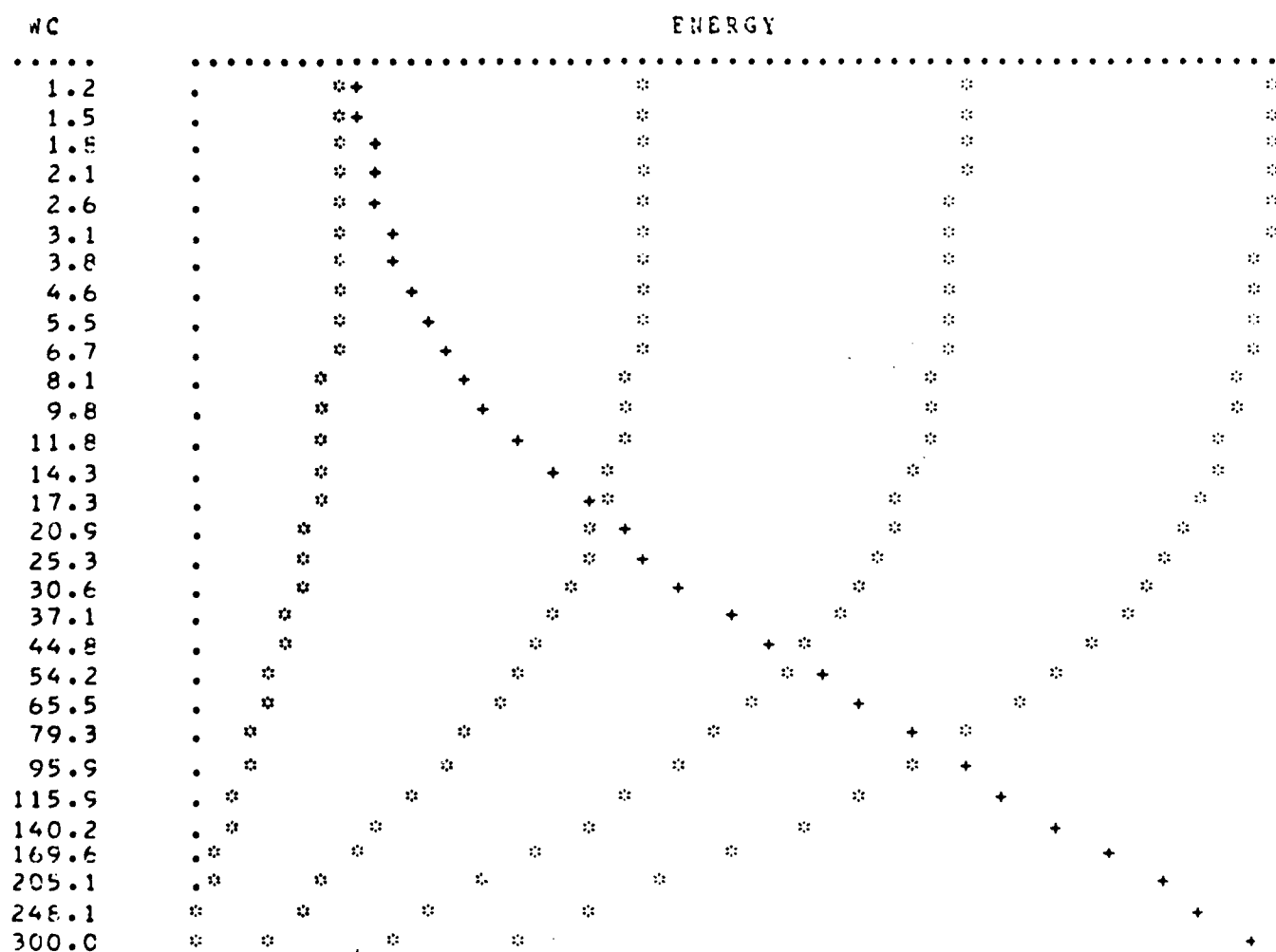


Figure 21

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	96.900	87.135	262.886	438.905	615.037	791.233
1.5	99.425	86.891	262.461	438.357	614.386	790.495
1.8	102.290	86.598	261.949	437.693	613.601	789.604
2.1	105.592	86.244	261.331	436.893	612.652	788.527
2.6	109.455	85.818	260.585	435.927	611.507	787.227
3.1	114.030	85.306	259.686	434.761	610.125	785.658
3.8	119.500	84.691	258.602	433.356	608.457	783.764
4.6	126.081	83.953	257.298	431.662	606.447	781.479
5.5	134.030	83.068	255.730	429.622	604.024	778.725
6.7	143.647	82.012	253.846	427.169	601.107	775.408
8.1	155.295	80.752	251.586	424.220	597.599	771.415
9.8	169.408	79.255	248.881	420.682	593.383	766.613
11.8	186.513	77.483	245.648	416.442	588.324	760.846
14.3	207.220	75.394	241.796	411.372	582.264	753.930
17.3	230.393	72.945	237.219	405.325	575.020	745.651
20.9	247.067	70.095	231.803	398.132	566.382	735.761
25.3	262.729	66.805	225.423	389.608	556.112	723.979
30.6	281.547	63.044	217.950	379.550	543.946	709.988
37.1	304.615	58.801	209.258	367.745	529.598	693.437
44.8	332.831	54.083	199.234	353.980	512.770	673.952
54.2	357.824	48.936	187.794	338.054	493.164	651.147
65.5	380.555	43.443	174.902	319.809	470.504	624.644
79.3	409.114	37.737	160.598	299.153	444.576	594.112
95.9	437.724	31.993	145.026	276.104	415.267	559.310
115.9	463.976	26.419	128.454	250.837	382.624	520.153
140.2	494.122	21.223	111.296	223.724	346.920	476.793
169.6	521.182	16.585	94.090	195.371	308.713	429.695
205.1	548.409	12.626	77.461	166.610	268.888	379.718
248.1	575.857	9.387	62.035	138.444	228.643	328.141
300.0	601.801	6.839	48.334	111.934	189.403	276.621

Table 21A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	967.474	1143.748	1320.047	1496.366	1672.703
1.5	966.658	1142.860	1319.093	1495.351	1671.629
1.8	965.672	1141.788	1317.941	1494.124	1670.332
2.1	964.481	1140.493	1316.549	1492.641	1668.764
2.6	963.043	1138.929	1314.867	1490.850	1666.870
3.1	961.306	1137.038	1312.836	1488.687	1664.582
3.8	959.209	1134.757	1310.384	1486.075	1661.819
4.6	956.680	1132.004	1307.424	1482.922	1658.483
5.5	953.630	1128.684	1303.854	1479.118	1654.459
6.7	949.954	1124.682	1299.549	1474.530	1649.604
8.1	945.528	1119.860	1294.362	1469.001	1643.753
9.8	940.203	1114.057	1288.117	1462.341	1636.703
11.8	933.803	1107.079	1280.604	1454.329	1628.219
14.3	926.121	1098.699	1271.577	1444.696	1618.016
17.3	916.916	1088.649	1260.745	1433.133	1605.764
20.9	905.908	1076.620	1247.770	1419.274	1591.070
25.3	892.774	1062.251	1232.259	1402.694	1573.482
30.6	877.149	1045.135	1213.762	1382.905	1552.475
37.1	858.626	1024.812	1191.770	1359.353	1527.451
44.6	836.763	1000.774	1165.719	1331.416	1497.737
54.2	811.090	972.481	1134.996	1298.419	1462.594
65.5	781.138	939.372	1098.961	1259.642	1421.228
79.3	746.466	900.906	1056.973	1214.354	1372.824
95.9	706.710	856.605	1008.447	1161.864	1316.588
115.9	661.659	806.128	952.918	1101.589	1251.823
140.2	611.330	749.363	890.144	1033.157	1178.030
169.6	556.078	686.540	820.224	956.537	1095.048
205.1	496.691	618.351	743.741	872.192	1003.213
248.1	434.458	546.053	661.889	781.232	903.537
300.0	371.177	471.514	576.560	685.537	797.861

Table 21B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.60470E 11	.43599E 1	.39057E 1	.39057E 1	.39057E 1
1.5	.73133E 11	.43599E 1	.39057E 1	.39057E 1	.39057E 1
1.8	.88447E 11	.49049E 1	.39057E 1	.39057E 1	.39057E 1
2.1	.10697E 12	.59948E 1	.39057E 1	.39057E 1	.39057E 1
2.6	.12937E 12	.87198E 1	.39057E 1	.39057E 1	.39057E 1
3.1	.15646E 12	.14351E 2	.39057E 1	.39057E 1	.39057E 1
3.8	.18922E 12	.32154E 2	.39057E 1	.39057E 1	.39057E 1
4.6	.22864E 12	.96099E 2	.39057E 1	.39057E 1	.39057E 1
5.5	.27676E 12	.39130E 3	.39057E 1	.39057E 1	.39057E 1
6.7	.33472E 12	.21981E 4	.39057E 1	.39057E 1	.39057E 1
8.1	.40481E 12	.17863E 5	.39057E 1	.39057E 1	.39057E 1
9.8	.48957E 12	.22544E 6	.39057E 1	.39057E 1	.39057E 1
11.8	.59209E 12	.48371E 7	.39057E 1	.39057E 1	.39057E 1
14.3	.71588E 12	.19565E 9	.39057E 1	.39057E 1	.39057E 1
17.3	.85502E 12	.11004E 11	.39057E 1	.39057E 1	.39057E 1
20.9	.96105E 12	.86327E 11	.87198E 1	.39057E 1	.39057E 1
25.3	.10640E 13	.20272E 12	.18157E 3	.39057E 1	.39057E 1
30.6	.11866E 13	.34536E 12	.13799E 5	.39057E 1	.39057E 1
37.1	.13349E 13	.51784E 12	.26488E 7	.39057E 1	.39057E 1
44.8	.15137E 13	.72550E 12	.14557E 10	.39057E 1	.39057E 1
54.2	.16774E 13	.92335E 12	.10914E 12	.53681E 2	.39057E 1
65.5	.18307E 13	.11168E 13	.32988E 12	.46463E 5	.39057E 1
79.3	.20168E 13	.13496E 13	.59715E 12	.17125E 9	.39057E 1
95.9	.22033E 13	.15895E 13	.87768E 12	.12315E 12	.39057E 3
115.9	.23762E 13	.18221E 13	.11575E 13	.44178E 12	.75559E 7
140.2	.25681E 13	.20789E 13	.14684E 13	.79938E 12	.96655E 11
169.6	.27402E 13	.23193E 13	.17693E 13	.11538E 13	.49682E 12
205.1	.29096E 13	.25575E 13	.20734E 13	.15179E 13	.91608E 12
248.1	.30762E 13	.27903E 13	.23754E 13	.18856E 13	.13452E 13
300.0	.32309E 13	.30056E 13	.26602E 13	.22395E 13	.17659E 13

Table 21C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10
1.2	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
1.5	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
1.8	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
2.1	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
2.6	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
3.1	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
3.8	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
4.6	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
5.5	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
6.7	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
8.1	.39057E	1	.39057E	1	.00000E	0	.00000E	0	.00000E
9.8	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E
11.8	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E
14.3	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E
17.3	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E
20.9	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E
25.3	.39057E	1	.39057E	1	.39057E	1	.00000E	0	.00000E
30.6	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.00000E
37.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.00000E
44.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.00000E
54.2	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E
65.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E
79.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E
95.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E
115.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E
140.2	.76652E	3	.39057E	1	.39057E	1	.39057E	1	.39057E
169.6	.18645E	9	.43599E	1	.39057E	1	.39057E	1	.39057E
205.1	.28087E	12	.94868E	6	.39057E	1	.39057E	1	.39057E
248.1	.76787E	12	.16225E	12	.83668E	5	.39057E	1	.39057E
300.0	.12524E	13	.70752E	12	.13786E	12	.11856E	6	.39057E

Table 21D

NINSB K1 = K2 = K3 = 0.013 EL = 17.0
 DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER
 TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
 WC IN ANGSTROMS

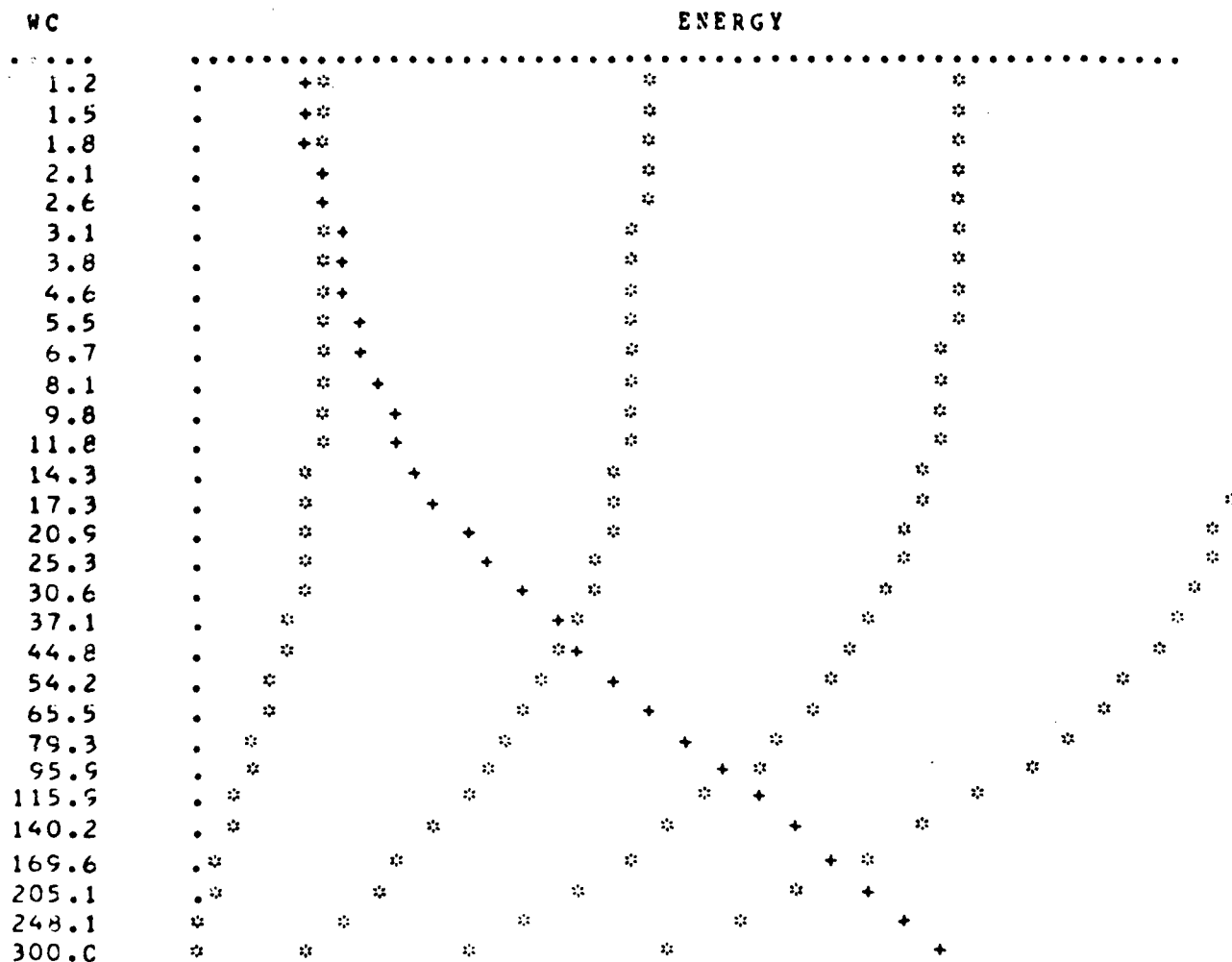


Figure 22

$W_c (\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	33.046	39.141	117.867	196.674	275.513	354.373
1.5	34.482	39.068	117.740	196.509	275.319	354.152
1.8	35.958	38.979	117.586	196.310	275.083	353.885
2.1	37.484	38.873	117.400	196.070	274.799	353.562
2.6	39.074	38.744	117.176	195.780	274.455	353.172
3.1	40.744	38.589	116.905	195.430	274.040	352.701
3.8	42.517	38.403	116.579	195.007	273.539	352.132
4.6	44.422	38.179	116.186	194.497	272.934	351.445
5.5	46.496	37.909	115.712	193.882	272.204	350.617
6.7	48.789	37.586	115.141	193.141	271.325	349.617
8.1	51.366	37.199	114.454	192.248	270.264	348.412
9.8	54.313	36.736	113.629	191.174	268.988	346.960
11.8	57.736	36.184	112.640	189.883	267.452	345.212
14.3	61.771	35.528	111.455	188.334	265.606	343.110
17.3	66.581	34.750	110.039	186.477	263.391	340.585
20.9	72.358	33.834	108.350	184.256	260.737	337.557
25.3	79.292	32.758	106.344	181.606	257.564	333.930
30.6	87.400	31.506	103.968	178.453	253.778	329.598
37.1	95.838	30.058	101.168	174.715	249.276	324.434
44.8	103.170	28.401	97.886	170.301	243.940	318.299
54.2	109.906	26.528	94.065	165.118	237.644	311.039
65.5	117.342	24.442	89.654	159.068	230.254	302.487
79.3	126.302	22.161	84.612	152.063	221.637	292.470
95.9	136.650	19.720	78.922	144.027	211.668	280.813
115.9	145.668	17.176	72.596	134.915	200.246	267.379
140.2	154.377	14.605	65.693	124.729	187.315	252.041
169.6	164.843	12.098	58.326	113.538	172.886	234.755
205.1	174.043	9.750	50.671	101.497	157.067	215.574
246.1	183.792	7.643	42.965	88.864	140.74	194.690
300.0	192.842	5.836	35.484	76.001	122.342	172.463

Table 22A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	433.246	512.128	591.018	669.914	748.816
1.5	433.001	511.862	590.733	669.610	748.494
1.8	432.706	511.541	590.387	669.243	748.106
2.1	432.349	511.153	589.970	668.799	747.636
2.6	431.917	510.684	589.466	668.262	747.068
3.1	431.396	510.117	588.857	667.613	746.382
3.8	430.767	509.432	588.121	666.830	745.554
4.6	430.007	508.606	587.233	665.883	744.553
5.5	429.090	507.607	586.160	664.740	743.344
6.7	427.983	506.403	584.865	663.361	741.885
8.1	426.648	504.950	583.303	661.696	740.124
9.8	425.040	503.199	581.419	659.689	737.999
11.8	423.102	501.088	579.149	657.269	735.438
14.3	420.771	498.548	576.415	654.354	732.353
17.3	417.970	495.494	573.127	650.847	728.640
20.9	414.606	491.825	569.175	646.630	724.173
25.3	410.575	487.424	564.432	641.567	718.809
30.6	405.753	482.155	558.749	635.498	712.375
37.1	399.997	475.860	551.954	628.235	704.671
44.8	393.148	468.358	543.849	619.564	695.467
54.2	385.025	459.447	534.208	609.241	684.500
65.5	375.432	448.903	522.782	596.991	671.472
79.3	364.160	436.484	509.300	582.513	656.055
95.9	350.998	421.940	493.475	565.489	637.898
115.9	335.747	405.028	475.022	545.590	616.636
140.2	318.238	385.529	453.672	522.505	591.911
169.6	298.368	363.281	429.211	495.965	563.404
205.1	276.130	338.220	401.516	465.790	530.880
248.1	251.663	310.428	370.609	431.945	494.244
300.0	225.294	280.188	336.725	394.607	453.618

Table 22B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.12094E	11	.10067E	6	.43599E	1	.39057E	1	.39057E	1
1.5	.14626E	11	.12742E	6	.49049E	1	.39057E	1	.39057E	1
1.8	.17689E	11	.16290E	6	.49049E	1	.39057E	1	.39057E	1
2.1	.21393E	11	.21087E	6	.53590E	1	.39057E	1	.39057E	1
2.6	.25873E	11	.27720E	6	.59948E	1	.39057E	1	.39057E	1
3.1	.31291E	11	.37143E	6	.65398E	1	.39057E	1	.39057E	1
3.8	.37843E	11	.50972E	6	.75390E	1	.39057E	1	.39057E	1
4.6	.45768E	11	.72076E	6	.90831E	1	.39057E	1	.39057E	1
5.5	.55351E	11	.10583E	7	.11717E	2	.39057E	1	.39057E	1
6.7	.66942E	11	.16298E	7	.16531E	2	.39057E	1	.39057E	1
8.1	.80959E	11	.26659E	7	.25433E	2	.39057E	1	.39057E	1
9.8	.97910E	11	.47071E	7	.43236E	2	.39057E	1	.39057E	1
11.8	.11841E	12	.91547E	7	.84109E	2	.39057E	1	.39057E	1
14.3	.14320E	12	.20107E	8	.19002E	3	.39057E	1	.39057E	1
17.3	.17315E	12	.51387E	8	.51229E	3	.39057E	1	.39057E	1
20.9	.20932E	12	.15812E	9	.17022E	4	.39057E	1	.39057E	1
25.3	.25273E	12	.60488E	9	.72069E	4	.39057E	1	.39057E	1
30.6	.30354E	12	.28474E	10	.39340E	5	.43599E	1	.39057E	1
37.1	.35722E	12	.13327E	11	.24663E	6	.70848E	1	.39057E	1
44.8	.40604E	12	.42102E	11	.14492E	7	.25978E	2	.39057E	1
54.2	.45278E	12	.89189E	11	.87395E	7	.15959E	3	.39057E	1
65.5	.50449E	12	.15091E	12	.66699E	8	.14616E	4	.39057E	1
79.3	.56554E	12	.22646E	12	.73350E	9	.20631E	5	.43599E	1
95.9	.63499E	12	.31350E	12	.10241E	11	.44132E	6	.16985E	2
115.9	.69778E	12	.39682E	12	.64890E	11	.96150E	7	.39075E	3
140.2	.75903E	12	.48160E	12	.16141E	12	.25026E	9	.14524E	5
169.6	.82948E	12	.57844E	12	.27863E	12	.93792E	10	.95290E	6
205.1	.89220E	12	.66997E	12	.39396E	12	.94870E	11	.68684E	8
248.1	.95658E	12	.76476E	12	.51550E	12	.23735E	12	.63685E	10
300.0	.10155E	13	.85454E	12	.63451E	12	.38285E	12	.11230E	12

Table 22C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
1.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
1.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
2.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
2.6	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
3.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
3.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
4.6	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
5.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
6.7	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
8.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
9.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
11.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
14.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
17.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
20.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
25.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
30.6	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
37.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
44.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
54.2	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
65.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
79.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
95.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
115.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
140.2	.43599E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
169.6	.68941E	2	.39057E	1	.39057E	1	.39057E	1	.39057E	:
205.1	.74575E	4	.43599E	1	.39057E	1	.39057E	1	.39057E	:
248.1	.12963E	7	.18784E	3	.39057E	1	.39057E	1	.39057E	1
300.0	.26925E	9	.68795E	5	.17530E	2	.39057E	1	.39057E	:

Table 22D

GRAPH OF ENERGY LEVELS VS. WC

NINSB K1 = K2 = K3 = 0.013 EL = 17.0
 DONOR CONCENTRATION = .5E 18/CUBIC CENTIMETER
 TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
 WC IN ANGSTROMS

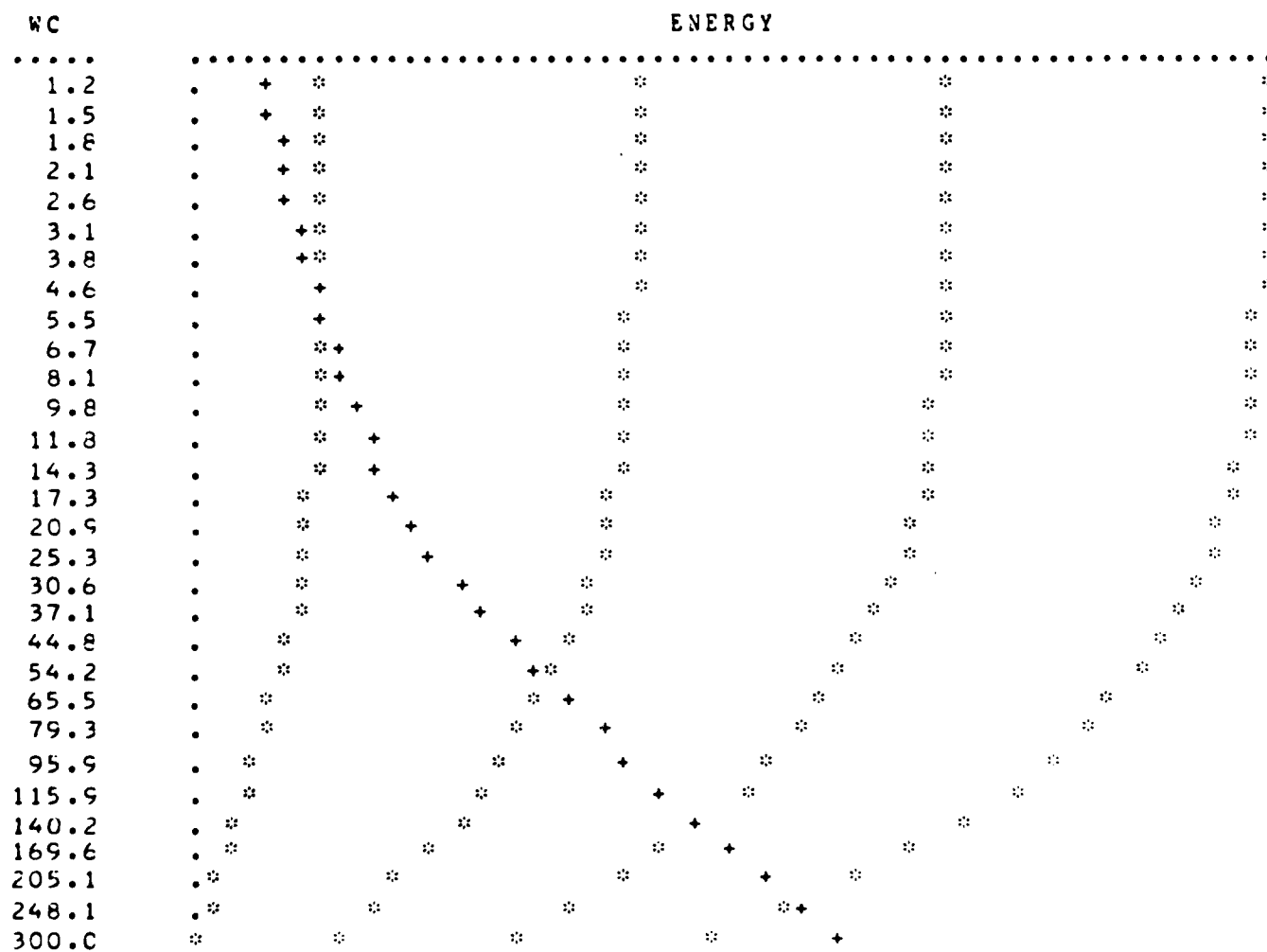


Figure 23

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	16.442	27.716	83.413	139.158	194.922	250.698
1.5	17.780	27.673	83.337	139.060	194.806	250.567
1.8	19.135	27.620	83.246	138.941	194.666	250.408
2.1	20.510	27.556	83.135	138.798	194.497	250.216
2.6	21.912	27.480	83.002	138.626	194.292	249.984
3.1	23.347	27.387	82.840	138.417	194.045	249.703
3.8	24.822	27.276	82.646	138.165	193.747	249.365
4.6	26.348	27.142	82.411	137.861	193.387	248.956
5.5	27.940	26.981	82.128	137.495	192.952	248.462
6.7	29.615	26.787	81.788	137.053	192.427	247.866
8.1	31.397	26.555	81.377	136.520	191.795	247.147
9.8	33.316	26.277	80.884	135.878	191.032	246.281
11.8	35.414	25.944	80.291	135.106	190.115	245.237
14.3	37.743	25.548	79.580	134.178	189.011	243.981
17.3	40.374	25.077	78.729	133.065	187.684	242.470
20.9	43.394	24.519	77.712	131.731	186.093	240.656
25.3	46.908	23.861	76.499	130.136	184.186	238.480
30.6	51.028	23.090	75.059	128.233	181.906	235.874
37.1	55.813	22.193	73.354	125.969	179.188	232.762
44.8	61.115	21.156	71.345	123.286	175.956	229.054
54.2	66.427	19.971	68.992	120.120	172.126	224.651
65.5	71.351	18.634	66.255	116.403	167.609	219.441
79.3	76.168	17.146	63.097	112.068	162.311	213.307
95.9	81.455	15.522	59.492	107.051	156.136	206.126
115.9	87.566	13.787	55.428	101.303	148.999	197.779
140.2	93.912	11.984	50.917	94.792	140.829	188.160
169.6	99.597	10.167	46.002	87.524	131.590	177.193
205.1	105.614	8.402	40.769	79.551	121.296	164.848
248.1	111.943	6.755	35.346	70.992	110.030	151.172
300.0	117.670	5.283	29.903	62.033	97.967	136.308

Table 23A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	306.482	362.272	418.066	473.864	529.665
1.5	306.337	362.114	417.897	473.683	529.474
1.8	306.161	361.923	417.691	473.465	529.243
2.1	305.949	361.692	417.443	473.201	528.964
2.6	305.692	361.413	417.143	472.881	528.626
3.1	305.382	361.075	416.781	472.495	528.218
3.8	305.007	360.668	416.343	472.029	527.724
4.6	304.555	360.176	415.814	471.465	527.129
5.5	304.008	359.581	415.175	470.785	526.409
6.7	303.349	358.863	414.403	469.963	525.540
8.1	302.553	357.998	413.472	468.971	524.490
9.8	301.593	356.953	412.349	467.775	523.224
11.8	300.437	355.694	410.995	466.331	521.697
14.3	299.045	354.177	409.363	464.592	519.856
17.3	297.369	352.351	407.398	462.497	517.639
20.9	295.356	350.156	405.034	459.976	514.969
25.3	292.939	347.519	402.194	456.945	511.759
30.6	290.042	344.357	398.786	453.307	507.904
37.1	286.578	340.572	394.703	448.946	503.281
44.8	282.445	336.050	389.822	443.729	497.747
54.2	277.527	330.664	384.001	437.502	491.136
65.5	271.697	324.267	377.080	430.089	483.261
79.3	264.815	316.701	368.880	421.296	473.908
95.9	256.732	307.793	359.208	410.909	462.846
115.9	247.300	297.368	347.862	398.700	449.823
140.2	236.378	285.253	334.639	384.439	434.582
169.6	223.852	271.296	319.353	367.906	416.870
205.1	209.652	255.389	301.856	348.915	396.467
248.1	193.782	237.493	282.069	327.348	373.212
300.C	176.351	217.678	260.020	303.189	347.050

Table 23B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.60455E 10	.14846E 7	.33617E 3	.39057E 1	.39057E 1
1.5	.73114E 10	.18372E 7	.41700E 3	.39057E 1	.39057E 1
1.8	.88424E 10	.22848E 7	.51919E 3	.39057E 1	.39057E 1
2.1	.10694E 11	.28586E 7	.65171E 3	.39057E 1	.39057E 1
2.6	.12933E 11	.36031E 7	.82574E 3	.39057E 1	.39057E 1
3.1	.15641E 11	.45829E 7	.10564E 4	.39057E 1	.39057E 1
3.8	.18916E 11	.58947E 7	.13694E 4	.43599E 1	.39057E 1
4.6	.22877E 11	.76873E 7	.18038E 4	.43599E 1	.39057E 1
5.5	.27666E 11	.10198E 8	.24218E 4	.43599E 1	.39057E 1
6.7	.33458E 11	.13619E 8	.33308E 4	.49049E 1	.39057E 1
8.1	.40461E 11	.19229E 8	.47203E 4	.49049E 1	.39057E 1
9.8	.48930E 11	.27661E 8	.69428E 4	.53590E 1	.39057E 1
11.8	.59168E 11	.41489E 8	.10698E 5	.65398E 1	.39057E 1
14.3	.71542E 11	.65594E 8	.17480E 5	.87198E 1	.39057E 1
17.3	.86492E 11	.11081E 9	.30735E 5	.12353E 2	.39057E 1
20.9	.10453E 12	.20340E 9	.59249E 5	.20164E 2	.39057E 1
25.3	.12626E 12	.41360E 9	.12801E 6	.41056E 2	.39057E 1
30.6	.15224E 12	.94926E 9	.31737E 6	.10091E 3	.39057E 1
37.1	.18280E 12	.24721E 10	.91848E 6	.30474E 3	.39057E 1
44.8	.21709E 12	.69819E 10	.30613E 7	.10936E 4	.43599E 1
54.2	.25231E 12	.18671E 11	.10988E 8	.43276E 4	.53590E 1
65.5	.28630E 12	.41400E 11	.40415E 8	.17952E 5	.11172E 2
79.3	.32052E 12	.75681E 11	.16034E 9	.82476E 5	.41601E 2
95.9	.35805E 12	.12056E 12	.75174E 9	.46426E 6	.25124E 3
115.9	.40066E 12	.17481E 12	.42766E 10	.34214E 7	.21933E 4
140.2	.44491E 12	.23354E 12	.22658E 11	.30513E 8	.24306E 5
169.6	.48565E 12	.29106E 12	.70972E 11	.28843E 9	.29919E 6
205.1	.52791E 12	.35214E 12	.14224E 12	.32368E 10	.47660E 7
248.1	.57123E 12	.41596E 12	.22246E 12	.30535E 11	.97151E 8
300.0	.61032E 12	.47662E 12	.30214E 12	.10880E 12	.21061E 10

Table 23C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
1.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
1.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
2.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
2.6	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
3.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
3.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
4.6	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
5.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
6.7	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
8.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
9.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
11.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
14.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
17.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
20.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
25.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
30.6	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
37.1	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
44.8	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
54.2	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
65.5	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
79.3	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
95.9	.39057E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
115.9	.49049E	1	.39057E	1	.39057E	1	.39057E	1	.39057E	1
140.2	.20619E	2	.39057E	1	.39057E	1	.39057E	1	.39057E	1
169.6	.26750E	3	.39057E	1	.39057E	1	.39057E	1	.39057E	1
205.1	.55585E	4	.96281E	1	.39057E	1	.39057E	1	.39057E	1
248.1	.15781E	6	.22090E	3	.39057E	1	.39057E	1	.39057E	1
300.0	.51809E	7	.10202E	5	.21164E	2	.39057E	1	.39057E	1

Table 23D

GRAPH OF ENERGY LEVELS VS. WC

NINSE K1 = K2 = K3 = 0.013 EL = 17.0
 DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
 TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
 WC IN ANGSTROMS

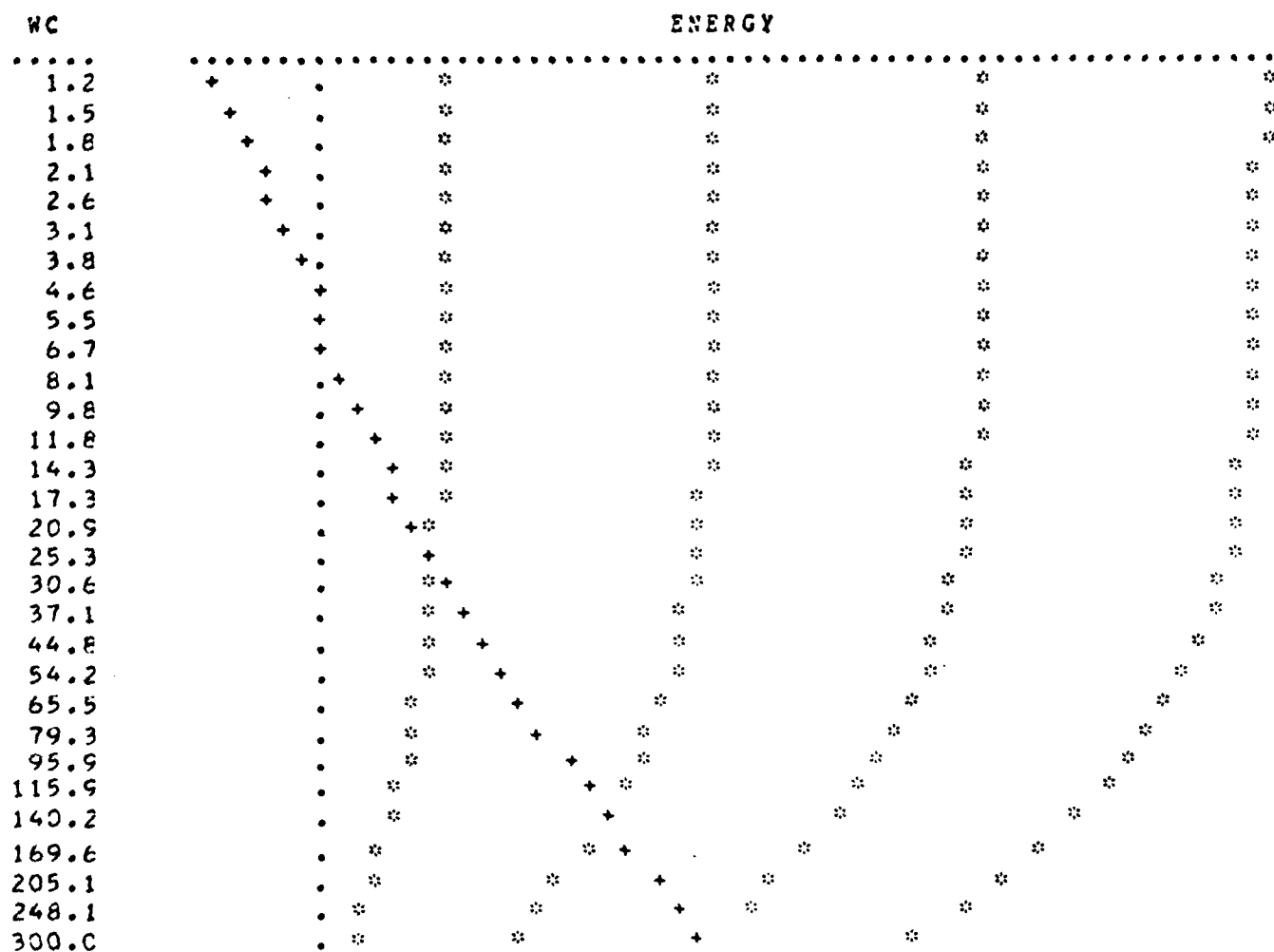


Figure 24

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-10.136	12.426	37.357	62.303	87.254	112.209
1.5	-8.866	12.413	37.334	62.273	87.219	112.169
1.8	-7.594	12.397	37.307	62.238	87.177	112.122
2.1	-6.319	12.378	37.274	62.195	87.127	112.064
2.6	-5.042	12.355	37.234	62.143	87.065	111.995
3.1	-3.761	12.327	37.185	62.081	86.991	111.911
3.8	-2.476	12.294	37.127	62.005	86.902	111.809
4.6	-1.185	12.253	37.056	61.914	86.794	111.687
5.5	.112	12.205	36.971	61.804	86.663	111.538
6.7	1.417	12.146	36.869	61.671	86.505	111.359
8.1	2.732	12.075	36.745	61.510	86.315	111.143
9.8	4.059	11.991	36.596	61.317	86.086	110.883
11.8	5.402	11.889	36.416	61.084	85.809	110.569
14.3	6.765	11.767	36.200	60.803	85.475	110.189
17.3	8.152	11.621	35.941	60.465	85.074	109.732
20.9	9.570	11.448	35.629	60.059	84.590	109.182
25.3	11.026	11.241	35.256	59.571	84.010	108.521
30.6	12.531	10.996	34.811	58.987	83.313	107.727
37.1	14.096	10.708	34.279	58.288	82.478	106.774
44.8	15.734	10.369	33.648	57.454	81.479	105.633
54.2	17.460	9.975	32.900	56.462	80.286	104.269
65.5	19.231	9.519	32.019	55.285	78.871	102.644
79.3	21.201	8.997	30.985	53.896	77.191	100.713
95.9	23.206	8.406	29.782	52.264	75.209	98.428
115.9	25.270	7.749	28.392	50.359	72.883	95.736
140.2	27.369	7.029	26.804	48.152	70.169	92.581
169.6	29.495	6.258	25.010	45.620	67.029	88.912
205.1	31.659	5.454	23.015	42.748	63.430	84.678
248.1	33.854	4.641	20.837	39.537	59.354	79.845
300.0	36.039	3.847	18.510	36.006	54.804	74.396

Table 24A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	137.166	162.125	187.085	212.047	237.009
1.5	137.122	162.078	187.034	211.992	236.952
1.8	137.070	162.020	186.973	211.927	236.882
2.1	137.006	161.951	186.899	211.848	236.799
2.6	136.929	161.868	186.809	211.752	236.698
3.1	136.836	161.767	186.700	211.637	236.575
3.8	136.724	161.644	186.569	211.497	236.428
4.6	136.588	161.497	186.410	211.328	236.249
5.5	136.424	161.319	186.219	211.124	236.033
6.7	136.226	161.103	185.987	210.878	235.773
8.1	135.987	160.843	185.708	210.590	235.458
9.8	135.699	160.529	185.370	210.220	235.078
11.8	135.351	160.150	184.963	209.786	234.618
14.3	134.931	159.693	184.471	209.263	234.064
17.3	134.425	159.142	183.879	208.631	233.396
20.9	133.815	158.478	183.165	207.870	232.591
25.3	133.082	157.679	182.305	206.953	231.620
30.6	132.200	156.718	181.270	205.849	230.452
37.1	131.142	155.564	180.027	204.523	229.046
44.8	129.874	154.179	178.534	202.930	227.359
54.2	128.356	152.521	176.746	201.020	225.334
65.5	126.545	150.540	174.608	198.735	222.910
79.3	124.390	148.179	172.057	196.006	220.014
95.9	121.833	145.375	169.023	192.757	216.562
115.9	118.813	142.058	165.427	188.901	212.462
140.2	115.264	138.148	161.182	184.344	207.609
169.6	111.119	133.600	156.200	178.984	201.893
205.1	106.315	128.375	150.389	172.718	195.198
248.1	100.799	122.007	143.664	165.447	187.411
300.0	94.527	115.080	135.956	157.086	178.431

Table 24B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.11808E 10	.27974E 8	.65106E 6	.15137E 5	.35560E 3
1.5	.14279E 10	.33992E 8	.79195E 6	.18427E 5	.43208E 3
1.8	.17266E 10	.41344E 8	.96451E 6	.22463E 5	.52646E 3
2.1	.20878E 10	.50347E 8	.11764E 7	.27430E 5	.64281E 3
2.6	.25245E 10	.61399E 8	.14374E 7	.33563E 5	.78650E 3
3.1	.30523E 10	.75009E 8	.17601E 7	.41168E 5	.96526E 3
3.8	.36903E 10	.91830E 8	.21609E 7	.50648E 5	.11890E 4
4.6	.44614E 10	.11271E 9	.26613E 7	.62535E 5	.14699E 4
5.5	.53931E 10	.13877E 9	.32902E 7	.77551E 5	.18269E 4
6.7	.65186E 10	.17151E 9	.40868E 7	.96685E 5	.22845E 4
8.1	.78780E 10	.21293E 9	.51049E 7	.12132E 6	.28763E 4
9.8	.95191E 10	.26584E 9	.64205E 7	.15341E 6	.36537E 4
11.8	.11499E 11	.33412E 9	.81426E 7	.19585E 6	.46900E 4
14.3	.13887E 11	.42336E 9	.10432E 8	.25291E 6	.60968E 4
17.3	.16765E 11	.54175E 9	.13529E 8	.33119E 6	.80493E 4
20.9	.20228E 11	.70152E 9	.17810E 8	.44111E 6	.10827E 5
25.3	.24388E 11	.92147E 9	.23873E 8	.59968E 6	.14899E 5
30.6	.29374E 11	.12312E 10	.32706E 8	.83577E 6	.21070E 5
37.1	.35329E 11	.16783E 10	.46002E 8	.12001E 7	.30796E 5
44.8	.42404E 11	.23413E 10	.66763E 8	.17860E 7	.46825E 5
54.2	.50744E 11	.33513E 10	.10052E 9	.27723E 7	.74592E 5
65.5	.60458E 11	.49264E 10	.15785E 9	.45174E 7	.12542E 6
79.3	.71585E 11	.74203E 10	.25958E 9	.77718E 7	.22411E 6
95.9	.84043E 11	.11367E 11	.44798E 9	.14175E 8	.42791E 6
115.9	.97631E 11	.17479E 11	.81091E 9	.27476E 8	.87661E 6
140.2	.11210E 12	.26535E 11	.15363E 10	.56739E 8	.19353E 7
169.6	.12726E 12	.39165E 11	.30363E 10	.12540E 9	.46368E 7
205.1	.14299E 12	.55509E 11	.62024E 10	.29824E 9	.12163E 8
248.1	.15908E 12	.75602E 11	.12747E 11	.76269E 9	.35082E 8
300.0	.17510E 12	.10709E 12	.25056E 11	.20671E 10	.11077E 9

Table 24C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.12353E	2	.39057E	1	.39057E	1	.39057E	1	.39057E	1
1.5	.13806E	2	.39057E	1	.39057E	1	.39057E	1	.39057E	1
1.8	.15986E	2	.43599E	1	.39057E	1	.39057E	1	.39057E	1
2.1	.18530E	2	.43599E	1	.39057E	1	.39057E	1	.39057E	1
2.6	.22163E	2	.43599E	1	.39057E	1	.39057E	1	.39057E	1
3.1	.26523E	2	.43599E	1	.39057E	1	.39057E	1	.39057E	1
3.8	.31609E	2	.43599E	1	.39057E	1	.39057E	1	.39057E	1
4.6	.38512E	2	.49049E	1	.39057E	1	.39057E	1	.39057E	1
5.5	.46869E	2	.49049E	1	.39057E	1	.39057E	1	.39057E	1
6.7	.57405E	2	.49049E	1	.39057E	1	.39057E	1	.39057E	1
8.1	.71393E	2	.53590E	1	.39057E	1	.39057E	1	.39057E	1
9.8	.90286E	2	.59948E	1	.39057E	1	.39057E	1	.39057E	1
11.8	.11545E	3	.65398E	1	.39057E	1	.39057E	1	.39057E	1
14.3	.15014E	3	.75390E	1	.39057E	1	.39057E	1	.39057E	1
17.3	.19837E	3	.87198E	1	.39057E	1	.39057E	1	.39057E	1
20.9	.26804E	3	.10173E	2	.39057E	1	.39057E	1	.39057E	1
25.3	.37132E	3	.12898E	2	.39057E	1	.39057E	1	.39057E	1
30.6	.53009E	3	.16985E	2	.43599E	1	.39057E	1	.39057E	1
37.1	.78541E	3	.23798E	2	.43599E	1	.39057E	1	.39057E	1
44.8	.12152E	4	.34879E	2	.49049E	1	.39057E	1	.39057E	1
54.2	.19789E	4	.55770E	2	.53590E	1	.39057E	1	.39057E	1
65.5	.34193E	4	.95645E	2	.65398E	1	.39057E	1	.39057E	1
79.3	.63168E	4	.17894E	3	.87198E	1	.39057E	1	.39057E	1
95.9	.12562E	5	.36496E	3	.13806E	2	.43599E	1	.39057E	1
115.9	.27032E	5	.81684E	3	.27976E	2	.43599E	1	.39057E	1
140.2	.63333E	5	.20152E	4	.66307E	2	.59948E	1	.39057E	1
169.6	.16301E	6	.55307E	4	.18639E	3	.96281E	1	.39057E	1
205.1	.46603E	6	.17100E	5	.61029E	3	.24888E	2	.43599E	1
248.1	.14904E	7	.60096E	5	.23307E	4	.90922E	2	.70848E	1
300.0	.53253E	7	.24037E	6	.10341E	5	.43154E	3	.21164E	2

Table 24D

GRAPH OF ENERGY LEVELS VS. WC

NINS3 K1 = K2 = K3 = 0.013 EL = 17.0
 DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
 TEMPERATURE = 4.2DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
 WC IN ANGSTROMS

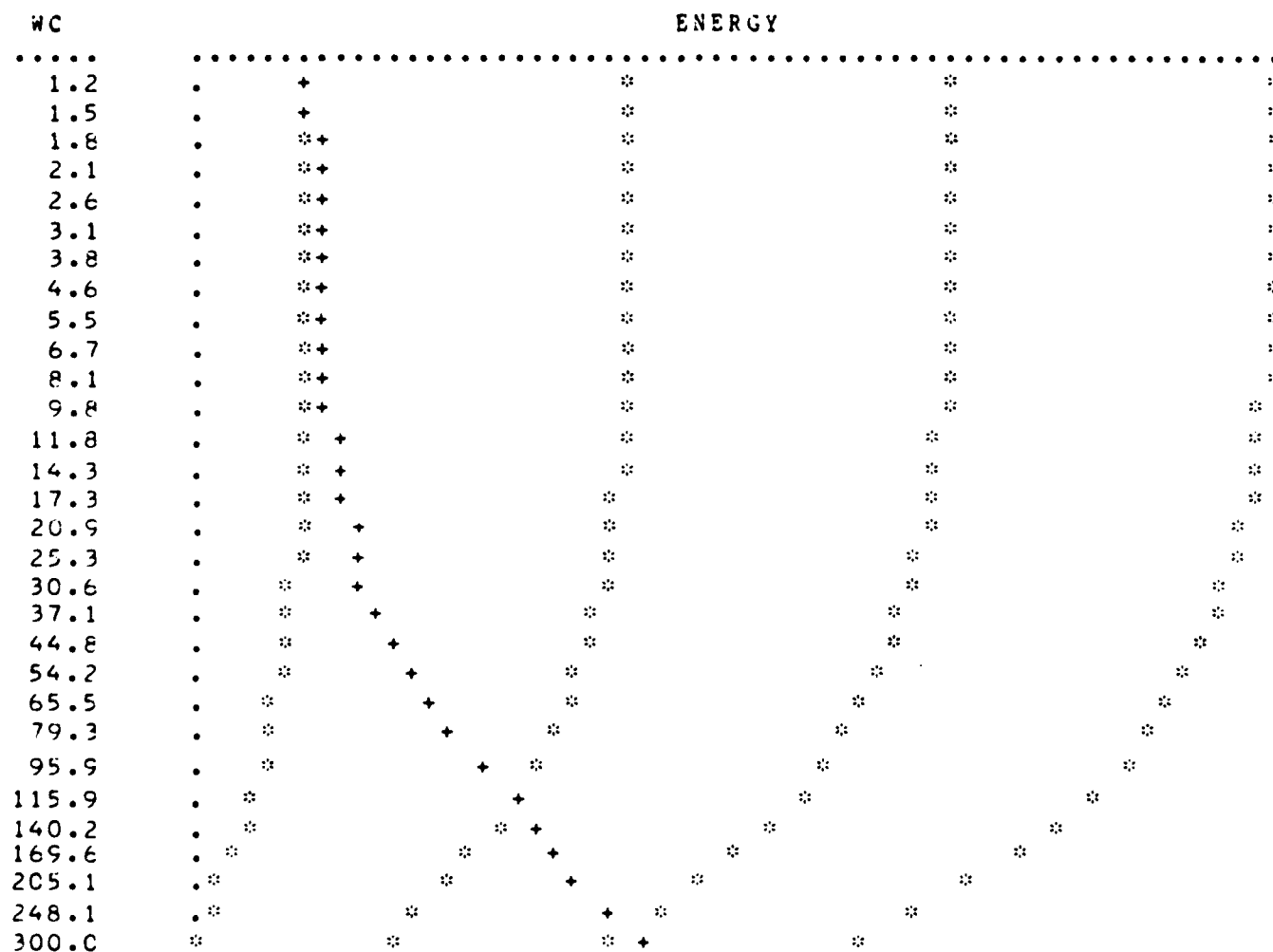


Figure 25

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	12.367	12.426	37.357	62.303	87.254	112.209
1.5	12.449	12.413	37.334	62.273	87.219	112.169
1.8	12.534	12.397	37.307	62.238	87.177	112.122
2.1	12.623	12.378	37.274	62.195	87.127	112.064
2.6	12.719	12.355	37.234	62.143	87.065	111.995
3.1	12.821	12.327	37.185	62.081	86.991	111.911
3.8	12.934	12.294	37.127	62.005	86.902	111.809
4.6	13.059	12.253	37.056	61.914	86.794	111.687
5.5	13.202	12.205	36.971	61.804	86.663	111.538
6.7	13.366	12.146	36.869	61.671	86.505	111.359
8.1	13.560	12.075	36.745	61.510	86.315	111.143
9.8	13.791	11.991	36.596	61.317	86.086	110.883
11.8	14.069	11.889	36.416	61.084	85.809	110.568
14.3	14.404	11.767	36.200	60.803	85.475	110.189
17.3	14.811	11.621	35.941	60.465	85.074	109.732
20.9	15.305	11.448	35.629	60.059	84.590	109.182
25.3	15.906	11.241	35.256	59.571	84.010	108.521
30.6	16.636	10.996	34.811	58.987	83.313	107.727
37.1	17.531	10.708	34.279	58.288	82.478	106.774
44.3	18.622	10.369	33.648	57.454	81.479	105.633
54.2	19.955	9.975	32.900	56.462	80.288	104.269
65.5	21.589	9.519	32.019	55.285	78.871	102.644
79.3	23.594	8.997	30.985	53.896	77.191	100.713
95.9	26.061	8.406	29.782	52.264	75.209	98.428
115.9	28.678	7.749	28.392	50.359	72.883	95.736
140.2	29.827	7.029	26.804	48.152	70.100	92.581
169.6	31.249	6.258	25.010	45.620	67.020	88.912
205.1	33.119	5.454	23.015	42.748	63.400	84.674
248.1	35.578	4.641	20.837	39.537	59.000	79.845
300.0	37.868	3.847	18.510	36.006	54.000	74.396

Table 25A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	137.166	162.125	187.085	212.047	237.009
1.5	137.122	162.078	187.034	211.992	236.952
1.8	137.070	162.020	186.973	211.927	236.882
2.1	137.006	161.951	186.899	211.848	236.799
2.6	136.929	161.868	186.809	211.752	236.698
3.1	136.836	161.767	186.700	211.637	236.575
3.8	136.724	161.644	186.569	211.497	236.428
4.6	136.588	161.497	186.410	211.328	236.249
5.5	136.424	161.319	186.219	211.124	236.033
6.7	136.226	161.103	185.987	210.878	235.773
8.1	135.987	160.843	185.708	210.580	235.458
9.8	135.699	160.529	185.370	210.220	235.078
11.8	135.351	160.150	184.963	209.786	234.618
14.3	134.931	159.693	184.471	209.263	234.064
17.3	134.425	159.142	183.879	208.631	233.396
20.9	133.815	158.478	183.165	207.870	232.591
25.3	133.082	157.679	182.305	206.953	231.620
30.6	132.200	156.718	181.270	205.849	230.452
37.1	131.142	155.564	180.027	204.523	229.046
44.8	129.874	154.179	178.534	202.930	227.359
54.2	128.356	152.521	176.746	201.020	225.334
65.5	126.545	150.540	174.608	198.735	222.910
79.3	124.390	148.179	172.057	196.006	220.014
95.9	121.833	145.375	169.023	192.757	216.562
115.9	118.813	142.056	165.427	188.901	212.462
140.2	115.264	138.146	161.182	184.344	207.609
169.6	111.119	133.566	156.200	178.984	201.893
205.1	106.315	128.240	150.389	172.718	195.198
248.1	100.799	122.097	143.664	165.447	187.411
300.0	94.537	115.086	135.456	157.086	178.431

Table 25B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1			N2			N3			N4			N5		
1.2	.12094E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
1.5	.14627E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
1.8	.17689E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
2.1	.21394E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
2.6	.25873E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
3.1	.31291E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
3.8	.37844E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
4.6	.45768E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
5.5	.55352E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
6.7	.66943E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
8.1	.80961E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
9.8	.97915E	10		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
11.2	.11842E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
14.3	.14322E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
17.3	.17321E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
20.9	.20947E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
25.3	.25334E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
30.6	.30639E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
37.1	.37055E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
44.8	.44814E	11		.21304E	0		.21304E	0		.00000E	0		.00000E	0	
54.2	.54198E	11		.21304E	0		.21304E	0		.21304E	0		.00000E	0	
65.5	.65547E	11		.21304E	0		.21304E	0		.21304E	0		.00000E	0	
79.3	.79273E	11		.25438E	1		.21304E	0		.21304E	0		.00000E	0	
95.9	.95873E	11		.67087E	5		.21304E	0		.21304E	0		.00000E	0	
115.9	.11366E	12		.22889E	10		.21304E	0		.21304E	0		.00000E	0	
140.2	.12381E	12		.16421E	11		.21304E	0		.21304E	0		.00000E	0	
169.6	.13571E	12		.33580E	11		.21304E	0		.21304E	0		.21304E	0	
205.1	.15024E	12		.54871E	11		.21304E	0		.21304E	0		.21304E	0	
248.1	.16800E	12		.80052E	11		.34780E	5		.21304E	0		.21304E	0	
300.0	.18475E	12		.10512E	12		.10125E	11		.21304E	0		.21304E	0	

Table 25C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
1.5	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
1.8	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
2.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
2.6	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
3.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
3.8	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
4.6	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
5.5	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
6.7	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
8.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
9.8	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
11.8	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
14.3	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
17.3	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
20.9	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
25.3	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
30.6	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
37.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
44.8	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
54.2	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
65.5	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
79.3	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
95.9	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
115.9	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
140.2	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
169.6	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
205.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
248.1	.00000E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0
300.0	.21304E	0	.00000E	0	.00000E	0	.00000E	0	.00000E	0

Table 25D

GRAPH OF ENERGY LEVELS VS. WC

NINAS K1 = K2 = K3 = 0.024 EL = 14.5

DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

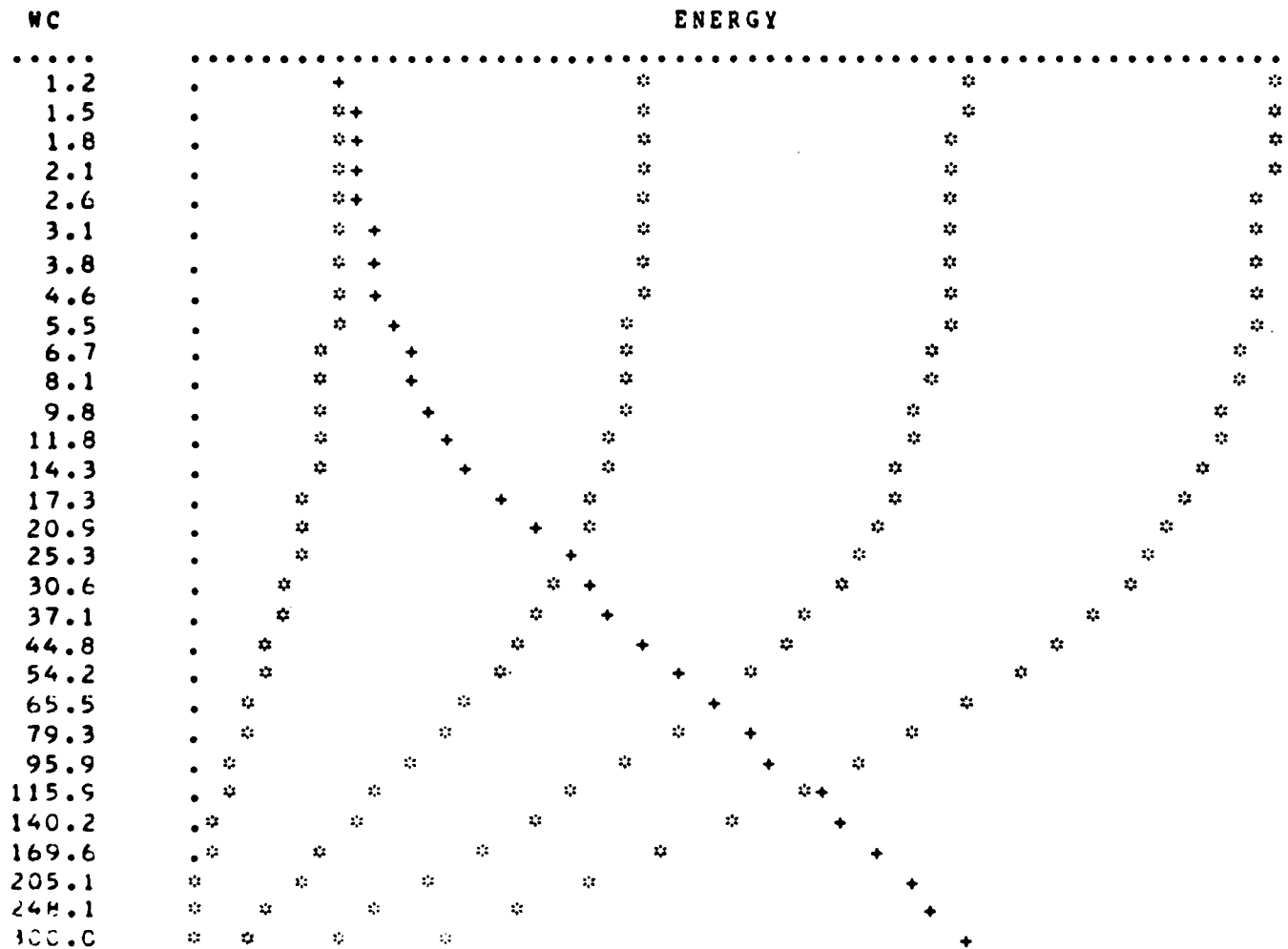


Figure 26

$W_c(A)$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	71.853	69.241	209.151	349.321	489.599	629.940
1.5	73.615	69.006	208.741	348.751	488.971	629.227
1.6	75.506	68.724	208.247	348.151	488.213	628.367
2.1	77.571	68.383	207.651	347.375	487.298	627.328
2.6	79.855	67.974	206.933	346.442	486.193	626.074
3.1	82.425	67.482	206.067	345.324	484.860	624.560
3.8	85.369	66.892	205.025	343.971	483.254	622.734
4.6	88.796	66.186	203.771	342.341	481.317	620.533
5.5	92.843	65.341	202.266	340.350	478.986	617.882
6.7	97.678	64.335	200.460	338.024	476.182	614.691
8.1	103.501	63.139	198.298	335.196	472.813	610.853
9.8	110.551	61.723	195.715	331.808	468.771	606.245
11.8	119.111	60.054	192.637	327.757	463.928	600.718
14.3	129.522	58.098	188.980	322.925	458.140	594.102
17.3	142.192	55.822	184.653	317.178	451.237	586.200
20.9	157.432	53.194	179.556	310.368	443.031	576.785
25.3	172.474	50.191	173.587	302.332	433.311	565.606
30.6	182.850	46.804	166.645	292.902	421.849	552.384
37.1	193.222	43.039	158.640	281.907	408.407	536.818
44.8	205.967	38.932	149.505	269.189	392.746	518.601
54.2	222.008	34.551	139.214	254.620	374.650	497.434
65.5	239.650	30.002	127.798	238.129	353.947	473.051
79.3	251.946	25.426	115.374	219.733	330.549	445.264
95.9	266.946	20.987	102.159	199.572	304.496	414.007
115.9	283.951	16.852	88.481	177.947	276.009	379.404
140.2	297.041	13.164	74.773	155.341	245.536	341.831
169.6	312.873	10.017	61.532	132.422	213.786	301.976
205.1	326.366	7.445	49.257	109.991	181.718	260.863
248.1	339.178	5.423	38.362	88.891	150.469	219.819
300.0	351.669	3.885	29.112	69.879	121.217	180.347

Table 26A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	770.324	910.739	1051.179	1191.639	1332.115
1.5	769.536	909.882	1050.258	1190.658	1331.078
1.8	768.584	908.847	1049.146	1189.473	1329.825
2.1	767.434	907.596	1047.801	1188.042	1328.311
2.6	766.046	906.086	1046.178	1186.313	1326.483
3.1	764.370	904.263	1044.218	1184.225	1324.274
3.8	762.349	902.063	1041.853	1181.705	1321.609
4.6	759.911	899.409	1039.000	1178.665	1318.392
5.5	756.974	896.211	1035.559	1174.999	1314.513
6.7	753.437	892.357	1031.414	1170.580	1309.836
8.1	749.181	887.720	1026.423	1165.258	1304.202
9.8	744.066	882.143	1020.419	1158.854	1297.422
11.8	737.928	875.446	1013.205	1151.157	1289.268
14.3	730.572	867.415	1004.549	1141.916	1279.477
17.3	721.775	857.803	994.181	1130.841	1267.735
20.9	711.281	846.322	981.786	1117.592	1253.681
25.3	698.796	832.645	967.006	1101.780	1236.895
30.6	683.997	816.407	949.435	1082.961	1216.900
37.1	666.530	797.203	928.621	1060.641	1193.159
44.8	646.023	774.600	904.077	1034.279	1165.082
54.2	622.098	748.154	875.291	1003.302	1132.036
65.5	594.407	717.431	841.755	967.128	1093.372
79.3	562.662	682.054	803.001	925.206	1048.457
95.9	526.695	641.752	758.662	877.074	996.737
115.9	486.525	596.439	708.548	822.440	937.819
140.2	442.438	548.304	652.744	761.283	871.579
169.6	395.069	491.905	591.720	693.979	798.291
205.1	345.450	434.250	526.436	621.422	718.773
248.1	295.021	374.836	458.409	545.119	634.501
300.0	245.530	315.590	389.689	467.206	547.663

Table 26B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.60470E	11	.74789E	2	.72106E	1	.72106E	1	.72106E	1
1.5	.73133E	11	.10195E	3	.72106E	1	.72106E	1	.72106E	1
1.8	.88447E	11	.14253E	3	.72106E	1	.72106E	1	.72106E	1
2.1	.10697E	12	.20944E	3	.72106E	1	.72106E	1	.72106E	1
2.6	.12937E	12	.32565E	3	.72106E	1	.72106E	1	.72106E	1
3.1	.15646E	12	.54146E	3	.72106E	1	.72106E	1	.72106E	1
3.8	.18922E	12	.98064E	3	.72106E	1	.72106E	1	.72106E	1
4.6	.22884E	12	.19784E	4	.72106E	1	.72106E	1	.72106E	1
5.5	.27676E	12	.45603E	4	.72106E	1	.72106E	1	.72106E	1
6.7	.33472E	12	.12399E	5	.72106E	1	.72106E	1	.72106E	1
8.1	.40481E	12	.41308E	5	.72106E	1	.72106E	1	.72106E	1
9.8	.48957E	12	.17648E	6	.72106E	1	.72106E	1	.72106E	1
11.8	.59209E	12	.10202E	7	.72106E	1	.72106E	1	.72106E	1
14.3	.71607E	12	.85068E	7	.72106E	1	.72106E	1	.72106E	1
17.3	.86592E	12	.11024E	9	.72106E	1	.72106E	1	.72106E	1
20.9	.10450E	13	.23261E	10	.13918E	2	.72106E	1	.72106E	1
25.3	.12259E	13	.40747E	11	.21615E	3	.72106E	1	.72106E	1
30.6	.13639E	13	.16601E	12	.41479E	4	.72106E	1	.72106E	1
37.1	.15057E	13	.34707E	12	.10379E	6	.72106E	1	.72106E	1
44.8	.16746E	13	.56608E	12	.48234E	7	.72106E	1	.72106E	1
54.2	.18794E	13	.83006E	12	.48527E	9	.13918E	2	.72106E	1
65.5	.21018E	13	.11214E	13	.54156E	11	.21913E	4	.72106E	1
79.3	.22710E	13	.13692E	13	.32347E	12	.47450E	6	.72106E	1
95.9	.24659E	13	.16521E	13	.67547E	12	.23091E	9	.22806E	2
115.9	.26778E	13	.19597E	13	.10628E	13	.97178E	11	.37422E	5
140.2	.28460E	13	.22284E	13	.14206E	13	.51639E	12	.77609E	8
169.6	.30363E	13	.25198E	13	.18091E	13	.99340E	12	.12101E	12
205.1	.31974E	13	.27782E	13	.21693E	13	.14502E	13	.65670E	12
248.1	.33461E	13	.30158E	13	.25093E	13	.18919E	13	.11966E	13
300.0	.34867E	13	.32338E	13	.28251E	13	.23104E	13	.17176E	13

Table 26C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
1.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
1.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
2.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
2.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
3.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
3.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
4.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
5.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
6.7	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
8.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
9.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
11.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
14.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.00000E	0
17.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
20.9	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
25.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
30.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
37.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
44.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
54.2	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
65.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
79.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
95.9	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
115.9	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
140.2	.27333E	2	.72106E	1	.72106E	1	.72106E	1	.72106E	1
169.6	.27610E	6	.72106E	1	.72106E	1	.72106E	1	.72106E	1
205.1	.36417E	10	.57495E	4	.72106E	1	.72106E	1	.72106E	1
248.1	.44278E	12	.30695E	9	.10454E	4	.72106E	1	.72106E	1
300.0	.10641E	13	.36201E	12	.21515E	9	.18187E	4	.72106E	1

Table 26D

GRAPH OF ENERGY LEVELS VS. WC

NINAS K1 = K2 = K3 = 0.024 EL = 14.5

DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

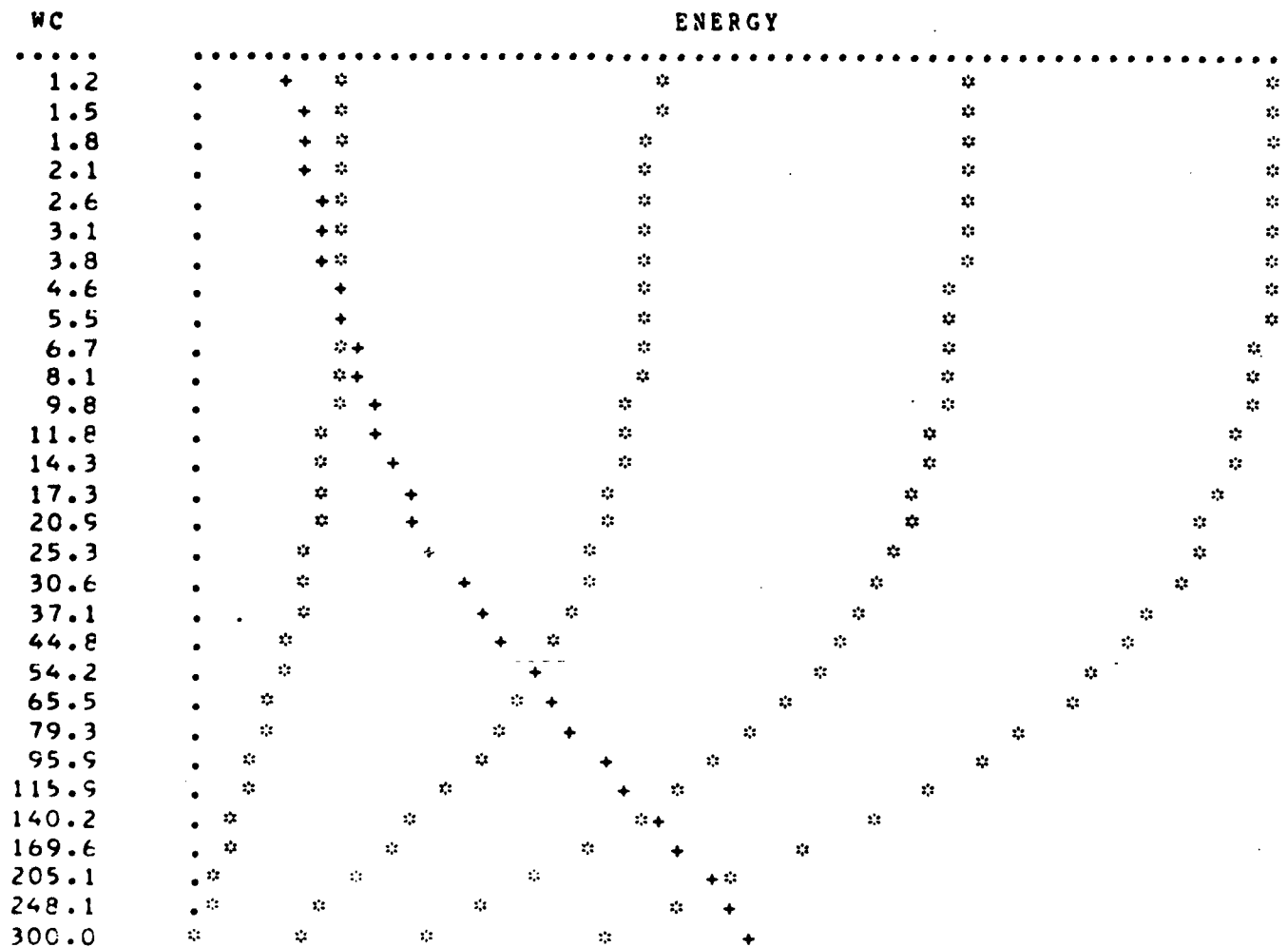


Figure 27

$w_c(\lambda)$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	20.438	31.132	93.826	156.597	219.400	282.222
1.5	21.759	31.062	93.703	156.438	219.212	282.009
1.8	23.094	30.976	93.554	156.246	218.985	281.751
2.1	24.446	30.874	93.375	156.014	218.710	281.439
2.6	25.820	30.750	93.159	155.734	218.378	281.063
3.1	27.222	30.601	92.898	155.396	217.978	280.608
3.8	28.658	30.422	92.584	154.989	217.494	280.059
4.6	30.140	30.207	92.205	154.497	216.911	279.397
5.5	31.681	29.948	91.749	153.905	216.208	278.598
6.7	33.298	29.639	91.200	153.191	215.361	277.635
8.1	35.015	29.269	90.541	152.333	214.341	276.475
9.8	36.863	28.828	89.750	151.301	213.113	275.078
11.8	38.887	28.304	88.803	150.063	211.638	273.398
14.3	41.142	27.682	87.672	148.579	209.868	271.380
17.3	43.705	26.950	86.322	146.805	207.747	268.960
20.9	46.672	26.091	84.719	144.687	205.211	266.062
25.3	50.162	25.090	82.821	142.168	202.187	262.600
30.6	54.302	23.934	80.584	139.181	198.589	258.474
37.1	59.166	22.611	77.962	135.656	194.326	253.573
44.8	64.544	21.116	74.910	131.515	189.296	247.772
54.2	69.700	19.452	71.388	126.683	183.393	240.940
65.5	74.168	17.631	67.362	121.088	176.510	232.938
79.3	78.474	15.684	62.820	114.671	168.548	223.632
95.9	83.371	13.656	57.771	107.396	159.428	212.900
115.9	89.100	11.607	52.264	99.266	149.105	200.653
140.2	94.445	9.611	46.388	90.337	137.588	186.854
169.6	99.128	7.742	40.286	80.732	124.967	171.547
205.1	104.473	6.067	34.146	70.660	111.428	154.885
248.1	109.202	4.630	28.189	60.409	97.275	137.159
300.0	113.975	3.450	22.638	50.332	82.926	118.810

Table 27A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	345.057	407.902	470.754	533.612	596.474
1.5	344.821	407.645	470.478	533.318	596.164
1.8	344.536	407.335	470.145	532.963	595.788
2.1	344.191	406.960	469.742	532.534	595.335
2.6	343.775	406.507	469.255	532.016	594.787
3.1	343.272	405.960	468.667	531.389	594.124
3.8	342.664	405.299	467.957	530.633	593.324
4.6	341.931	404.501	467.099	529.719	592.358
5.5	341.047	403.539	466.064	528.617	591.192
6.7	339.980	402.378	464.816	527.287	589.784
8.1	338.695	400.978	463.310	525.682	588.087
9.8	337.146	399.292	461.496	523.748	586.040
11.8	335.284	397.262	459.311	521.419	583.575
14.3	333.044	394.820	456.683	518.616	580.607
17.3	330.357	391.888	453.525	515.246	577.037
20.9	327.135	388.372	449.735	511.200	572.751
25.3	323.282	384.161	445.194	506.350	567.609
30.6	318.683	379.131	439.764	500.547	561.453
37.1	313.211	373.137	433.287	493.618	554.098
44.8	306.721	366.017	425.584	485.369	545.335
54.2	299.056	357.593	416.456	475.582	534.926
65.5	290.052	347.672	405.685	464.015	522.609
79.3	279.539	336.054	393.044	450.415	508.104
95.9	267.358	322.547	378.304	434.521	491.120
115.9	253.377	306.975	361.254	416.084	471.372
140.2	237.513	289.211	341.722	394.890	448.607
169.6	219.763	269.206	319.611	370.798	422.638
205.1	200.239	247.026	294.943	343.783	393.393
248.1	179.205	222.901	267.907	313.987	360.970
300.0	157.103	197.256	238.903	281.783	325.705

Table 27B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.12093E	11	.10417E	7	.88539E	2	.72106E	1	.72106E	1
1.5	.14625E	11	.12951E	7	.10766E	3	.72106E	1	.72106E	1
1.8	.17688E	11	.16196E	7	.13499E	3	.72106E	1	.72106E	1
2.1	.21392E	11	.20402E	7	.16886E	3	.72106E	1	.72106E	1
2.6	.25871E	11	.25929E	7	.21414E	3	.72106E	1	.72106E	1
3.1	.31288E	11	.33314E	7	.27618E	3	.72106E	1	.72106E	1
3.8	.37839E	11	.43380E	7	.36321E	3	.72106E	1	.72106E	1
4.6	.45763E	11	.57428E	7	.48613E	3	.72106E	1	.72106E	1
5.5	.55345E	11	.77598E	7	.66807E	3	.72106E	1	.72106E	1
6.7	.66933E	11	.10755E	8	.94677E	3	.72106E	1	.72106E	1
8.1	.80946E	11	.15388E	8	.13920E	4	.72106E	1	.72106E	1
9.8	.97892E	11	.22907E	8	.21447E	4	.72106E	1	.72106E	1
11.8	.11838E	12	.35844E	8	.35025E	4	.72106E	1	.72106E	1
14.3	.14316E	12	.59720E	8	.61501E	4	.80490E	1	.72106E	1
17.3	.17310E	12	.10767E	9	.11820E	5	.80490E	1	.72106E	1
20.9	.20926E	12	.21428E	9	.25432E	5	.98936E	1	.72106E	1
25.3	.25286E	12	.48181E	9	.62912E	5	.14924E	2	.72106E	1
30.6	.30514E	12	.12528E	10	.18422E	6	.31358E	2	.72106E	1
37.1	.36675E	12	.37988E	10	.65258E	6	.10095E	3	.72106E	1
44.8	.43549E	12	.12651E	11	.27410E	7	.45930E	3	.72106E	1
54.2	.50380E	12	.38170E	11	.12354E	8	.23991E	4	.72106E	1
65.5	.56682E	12	.88598E	11	.56302E	8	.13248E	5	.98936E	1
79.3	.62951E	12	.16294E	12	.28307E	9	.84180E	5	.28507E	2
95.9	.69894E	12	.25804E	12	.17540E	10	.69657E	6	.22688E	3
115.9	.77691E	12	.36957E	12	.13003E	11	.78341E	7	.3100E	4
140.2	.85051E	12	.48185E	12	.69830E	11	.99471E	8	.59210E	5
169.6	.91620E	12	.58994E	12	.18846E	12	.13386E	10	.12056E	7
205.1	.98658E	12	.70507E	12	.33940E	12	.19979E	11	.33266E	8
248.1	.10484E	13	.81221E	12	.48922E	12	.12976E	12	.97532E	9
300.0	.11081E	13	.91570E	12	.63806E	12	.31190E	12	.26177E	11

Table 27C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
1.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
1.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
2.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
2.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
3.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
3.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
4.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
5.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
6.7	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
8.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
9.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
11.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
14.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
17.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
20.9	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
25.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
30.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
37.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
44.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
54.2	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
65.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
79.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
95.9	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
115.9	.80490E	1	.72106E	1	.72106E	1	.72106E	1	.72106E	1
140.2	.35214E	2	.72106E	1	.72106E	1	.72106E	1	.72106E	1
169.6	.84699E	3	.80490E	1	.72106E	1	.72106E	1	.72106E	1
205.1	.35694E	5	.38065E	2	.72106E	1	.72106E	1	.72106E	1
248.1	.17351E	7	.23974E	4	.98936E	1	.72106E	1	.72106E	1
300.0	.99695E	8	.23441E	6	.44639E	3	.80490E	1	.72106E	1

Table 27D

GRAPH OF ENERGY LEVELS VS. WC

NINAS K1 = K2 = K3 = 0.024 EL = 14.5

DONOR CONCENTRATION = .5E 18/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

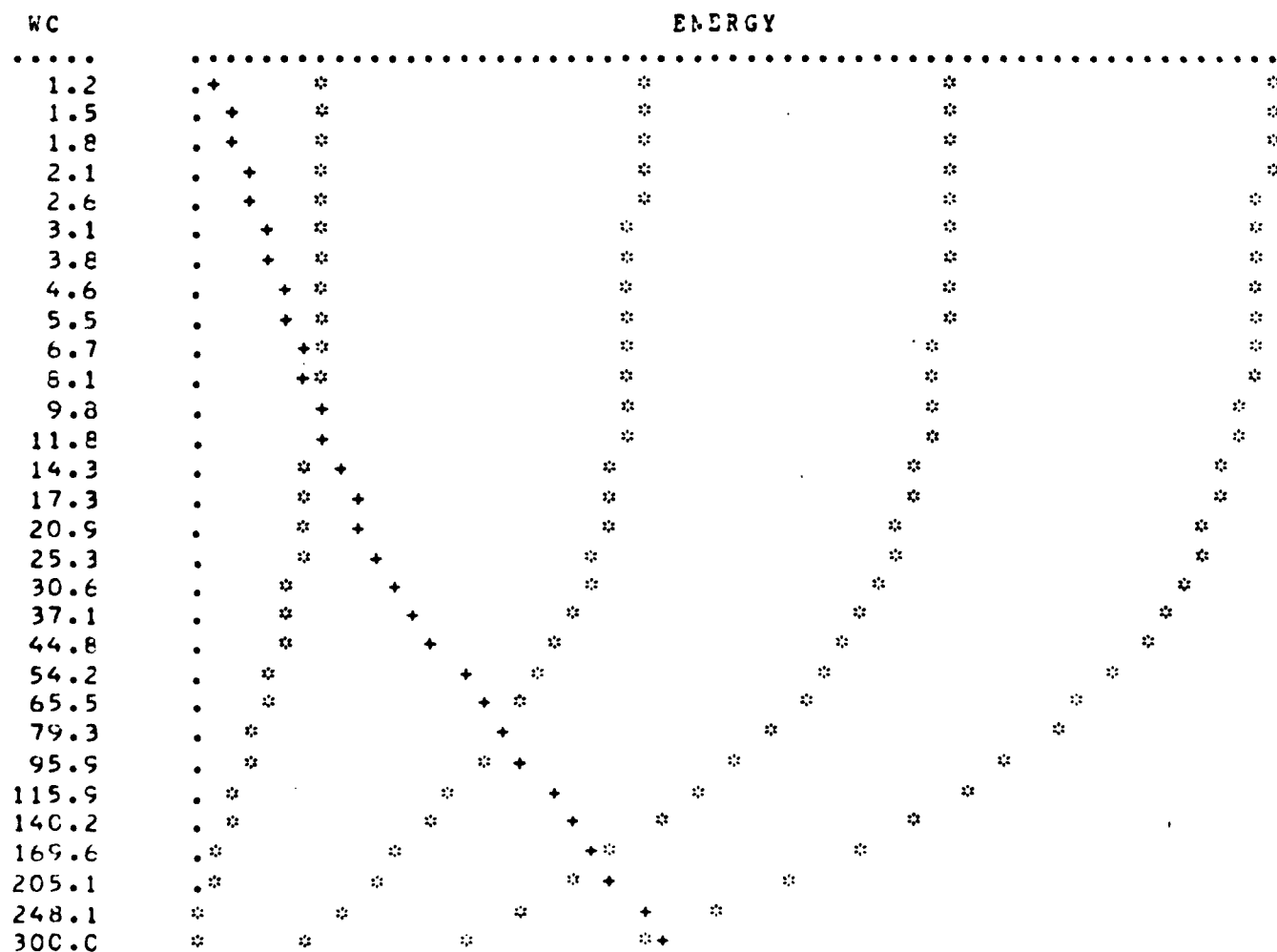


Figure 28

$W_c(\text{\AA})$	E_F	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	6.443	22.052	66.411	110.816	155.240	199.676
1.5	7.726	22.010	66.338	110.722	155.129	199.549
1.8	9.014	21.959	66.249	110.607	154.993	199.396
2.1	10.308	21.898	66.143	110.469	154.830	199.210
2.6	11.610	21.824	66.014	110.303	154.632	198.986
3.1	12.922	21.735	65.858	110.101	154.394	198.715
3.8	14.246	21.628	65.671	109.858	154.106	198.388
4.6	15.585	21.499	65.445	109.565	153.758	197.994
5.5	16.944	21.344	65.172	109.212	153.339	197.518
6.7	18.329	21.159	64.844	108.786	152.834	196.943
8.1	19.748	20.937	64.450	108.273	152.224	196.251
9.8	21.210	20.671	63.977	107.656	151.491	195.417
11.8	22.730	20.354	63.408	106.915	150.609	194.413
14.3	24.326	19.978	62.728	106.025	149.549	193.205
17.3	26.025	19.532	61.915	104.959	148.277	191.755
20.9	27.858	19.007	60.946	103.684	146.753	190.017
25.3	29.871	18.391	59.796	102.164	144.932	187.935
30.6	32.118	17.674	58.433	100.355	142.760	185.448
37.1	34.658	16.846	56.829	98.211	140.177	182.485
44.8	37.536	15.900	54.949	95.682	137.117	178.967
54.2	40.726	14.832	52.763	92.713	133.509	174.804
65.5	44.058	13.645	50.241	89.250	129.276	169.904
79.3	47.275	12.349	47.363	85.244	124.345	164.168
95.9	50.306	10.965	44.118	80.654	118.644	157.501
115.9	53.368	9.528	40.519	75.456	112.121	149.820
140.2	56.706	8.080	36.597	69.655	104.745	141.063
169.6	60.166	6.675	32.424	63.294	96.529	131.209
205.1	63.334	5.364	28.101	56.466	87.541	120.295
248.1	66.467	4.193	23.764	49.324	77.919	108.437
300.0	69.575	3.193	19.571	42.076	67.886	95.849

Table 28A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	244.119	288.568	333.022	377.478	421.938
1.5	243.979	288.416	332.857	377.304	421.753
1.8	243.809	288.231	332.659	377.092	421.530
2.1	243.604	288.008	332.419	376.837	421.260
2.6	243.356	287.738	332.130	376.529	420.934
3.1	243.057	287.412	331.780	376.156	420.540
3.8	242.695	287.019	331.357	375.706	420.063
4.6	242.256	286.544	330.846	375.162	419.488
5.5	241.731	285.970	330.230	374.505	418.794
6.7	241.095	285.278	329.486	373.712	417.955
8.1	240.328	284.444	328.588	372.756	416.943
9.8	239.404	283.437	327.506	371.602	415.723
11.8	238.291	282.225	326.201	370.212	414.251
14.3	236.952	280.766	324.631	368.538	412.479
17.3	235.343	279.012	322.742	366.523	410.346
20.9	233.412	276.904	320.472	364.101	407.780
25.3	231.097	274.378	317.749	361.194	404.700
30.6	228.329	271.353	314.487	357.709	401.005
37.1	225.027	267.740	310.586	353.540	396.583
44.8	221.098	263.436	305.935	348.564	391.301
54.2	216.439	258.325	300.405	342.641	385.008
65.5	210.941	252.280	293.853	335.616	377.535
79.3	204.484	245.164	286.127	327.317	368.697
95.9	196.950	236.836	277.063	317.565	358.294
115.9	188.228	227.160	266.502	306.173	346.119
140.2	178.225	216.015	254.294	292.969	331.973
169.6	166.889	203.314	240.323	277.804	315.679
205.1	154.222	189.029	224.526	260.585	297.112
248.1	140.313	173.215	206.928	241.302	276.229
300.C	125.358	156.046	187.673	220.069	253.112

Table 28B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1		N2		N3		N4		N5	
1.2	.60391E	10	.78778E	7	.97566E	4	.18781E	2	.72106E	1
1.5	.73036E	10	.96648E	7	.12007E	5	.21632E	2	.72106E	1
1.8	.98328E	10	.11893E	8	.14832E	5	.25489E	2	.72106E	1
2.1	.10682E	11	.14690E	8	.18405E	5	.30519E	2	.72106E	1
2.6	.12918E	11	.18226E	8	.22965E	5	.36221E	2	.72106E	1
3.1	.15623E	11	.22736E	8	.28846E	5	.43934E	2	.72106E	1
3.8	.18893E	11	.28553E	8	.36530E	5	.53660E	2	.72106E	1
4.6	.22848E	11	.36152E	8	.46720E	5	.67075E	2	.72106E	1
5.5	.27630E	11	.46231E	8	.60483E	5	.85521E	2	.72106E	1
6.7	.33412E	11	.59846E	8	.79467E	5	.11067E	3	.72106E	1
8.1	.40402E	11	.78645E	8	.10632E	6	.14840E	3	.72106E	1
9.8	.48852E	11	.10528E	9	.14546E	6	.20374E	3	.72106E	1
11.8	.59065E	11	.14419E	9	.20455E	6	.28859E	3	.72106E	1
14.3	.71404E	11	.20314E	9	.29756E	6	.42794E	3	.80490E	1
17.3	.86306E	11	.29642E	9	.45140E	6	.66539E	3	.80490E	1
20.9	.10428E	12	.45173E	9	.72123E	6	.10987E	4	.90551E	1
25.3	.12594E	12	.72632E	9	.12287E	7	.19532E	4	.98936E	1
30.6	.15195E	12	.12465E	10	.22643E	7	.37958E	4	.13080E	2
37.1	.18296E	12	.23099E	10	.45877E	7	.82095E	4	.20626E	2
44.8	.21941E	12	.46492E	10	.10367E	8	.20084E	5	.43934E	2
54.2	.26093E	12	.10035E	11	.26235E	8	.55961E	5	.11738E	3
65.5	.30559E	12	.22075E	11	.73049E	8	.17504E	6	.39038E	3
79.3	.35049E	12	.45654E	11	.21679E	9	.59791E	6	.14639E	4
95.9	.39459E	12	.84095E	11	.68164E	9	.22301E	7	.63773E	4
115.9	.43961E	12	.13778E	12	.23387E	10	.94612E	7	.32190E	5
140.2	.48754E	12	.20473E	12	.88274E	10	.47561E	8	.19930E	6
169.6	.53630E	12	.27914E	12	.32247E	11	.27607E	9	.14834E	7
205.1	.58120E	12	.35356E	12	.89060E	11	.17072E	10	.12395E	8
248.1	.62434E	12	.42823E	12	.17671E	12	.10888E	11	.11871E	9
300.0	.66553E	12	.50136E	12	.27675E	12	.55099E	11	.12544E	10

Table 28C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10
1.2	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
1.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
1.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
2.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
2.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
3.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
3.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
4.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
5.5	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
6.7	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
8.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
9.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
11.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
14.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
17.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
20.9	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
25.3	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
30.6	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
37.1	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
44.8	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
54.2	.72106E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
65.5	.80490E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
79.3	.98936E	1	.72106E	1	.72106E	1	.72106E	1	.72106E
95.9	.23812E	2	.72106E	1	.72106E	1	.72106E	1	.72106E
115.9	.10598E	3	.72106E	1	.72106E	1	.72106E	1	.72106E
140.2	.74252E	3	.98936E	1	.72106E	1	.72106E	1	.72106E
169.6	.68477E	4	.35214E	2	.72106E	1	.72106E	1	.72106E
205.1	.74462E	5	.39910E	3	.90551E	1	.72106E	1	.72106E
248.1	.97220E	6	.68225E	4	.49636E	2	.72106E	1	.72106E
300.0	.14804E	8	.14493E	6	.12380E	4	.16769E	2	.72106E

Table 28D

GRAPH OF ENERGY LEVELS VS. WC

NINAS K1 = K2 = K3 = 0.024 EL = 14.5

DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

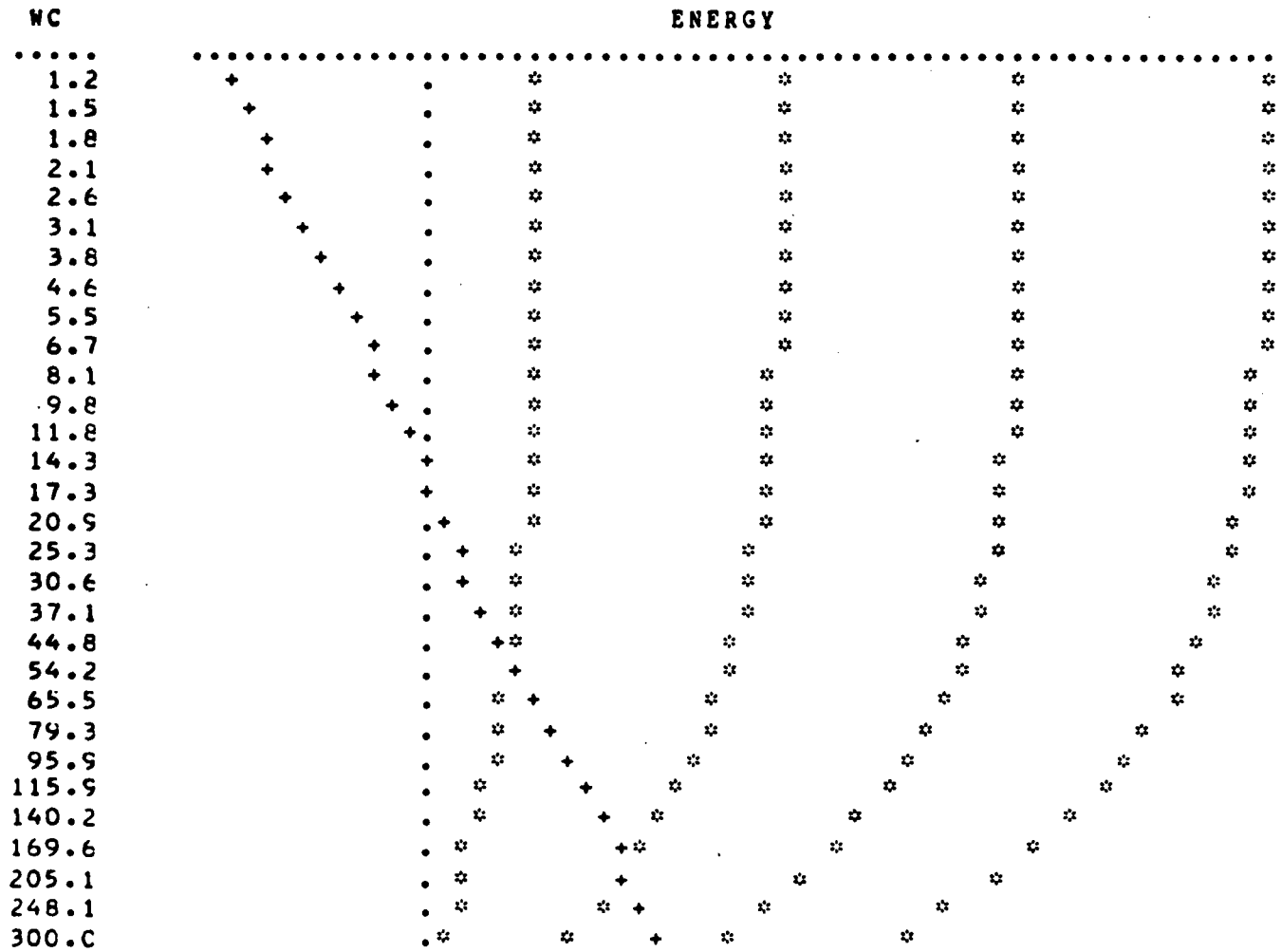


Figure 29

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-16.973	9.892	29.752	49.625	69.505	89.388
1.5	-15.714	9.879	29.730	49.597	69.471	89.350
1.8	-14.455	9.864	29.703	49.563	69.431	89.304
2.1	-13.196	9.845	29.671	49.522	69.382	89.248
2.6	-11.938	9.823	29.633	49.472	69.323	89.181
3.1	-10.680	9.796	29.586	49.411	69.251	89.100
3.8	-9.423	9.764	29.530	49.338	69.165	89.002
4.6	-8.166	9.725	29.462	49.250	69.060	88.883
5.5	-6.911	9.678	29.379	49.144	68.934	88.740
6.7	-5.656	9.622	29.281	49.016	68.782	88.568
8.1	-4.402	9.554	29.161	48.861	68.599	88.359
9.8	-3.149	9.473	29.018	48.675	68.378	88.108
11.8	-1.896	9.376	28.845	48.450	68.111	87.805
14.3	-.645	9.259	28.638	48.180	67.790	87.440
17.3	.607	9.120	28.389	47.856	67.404	87.001
20.9	1.859	8.955	28.091	47.466	66.940	86.472
25.3	3.112	8.760	27.735	46.999	66.383	85.837
30.6	4.368	8.529	27.310	46.441	65.716	85.076
37.1	5.630	8.259	26.806	45.774	64.918	84.164
44.8	6.899	7.944	26.208	44.981	63.966	83.074
54.2	8.180	7.579	25.504	44.041	62.834	81.776
65.5	9.475	7.163	24.679	42.931	61.492	80.233
79.3	10.787	6.691	23.717	41.628	59.908	78.407
95.9	12.117	6.166	22.608	40.106	58.050	76.257
115.9	13.459	5.592	21.339	38.344	55.882	73.737
140.2	14.806	4.977	19.907	36.322	53.374	70.806
169.6	16.145	4.336	18.315	34.029	50.501	67.425
205.1	17.467	3.688	16.577	31.466	47.247	63.566
249.1	18.764	3.056	14.722	28.648	43.615	59.216
300.0	20.026	2.464	12.793	25.616	39.633	54.388

Table 29A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	109.273	129.160	149.048	168.937	188.827
1.5	109.231	129.114	148.999	168.885	188.772
1.8	109.180	129.059	148.939	168.822	188.705
2.1	109.119	128.992	148.868	168.745	188.624
2.6	109.044	128.911	148.781	168.653	188.527
3.1	108.955	128.814	148.676	168.541	188.408
3.8	108.846	128.696	148.549	168.406	188.266
4.6	108.715	128.553	148.396	168.243	188.093
5.5	108.557	128.381	148.211	168.046	187.885
6.7	108.366	128.173	147.988	167.808	187.633
8.1	108.135	127.922	147.718	167.521	187.329
9.8	107.857	127.619	147.392	167.174	186.962
11.8	107.521	127.254	147.000	166.755	186.520
14.3	107.117	126.814	146.526	166.251	185.986
17.3	106.630	126.283	145.955	165.642	185.342
20.9	106.044	125.645	145.268	164.909	184.566
25.3	105.339	124.877	144.441	164.028	183.632
30.6	104.494	123.954	143.447	162.967	182.509
37.1	103.480	122.848	142.255	161.694	181.161
44.8	102.267	121.523	140.826	160.168	179.543
54.2	100.820	119.940	139.117	158.342	177.606
65.5	99.098	118.053	137.079	156.162	175.291
79.3	97.055	115.813	134.655	153.566	172.534
95.9	94.643	113.161	131.782	150.485	169.257
115.9	91.808	110.037	128.391	146.844	165.380
140.2	86.497	106.379	124.411	142.562	160.814
169.6	84.660	102.125	119.769	137.557	155.466
205.1	80.255	97.220	114.398	131.750	149.246
248.1	75.255	91.622	108.244	125.073	142.075
300.0	69.659	85.315	101.275	117.480	133.891

Table 29B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.11484E 10	.57985E 8	.28990E 7	.14477E 6	.72317E 4
1.5	.13886E 10	.70335E 8	.35202E 7	.17592E 6	.87929E 4
1.8	.16791E 10	.85368E 8	.42780E 7	.21400E 6	.10703E 5
2.1	.20302E 10	.10369E 9	.52043E 7	.26063E 6	.13047E 5
2.6	.24546E 10	.12606E 9	.63390E 7	.31790E 6	.15932E 5
3.1	.29676E 10	.15343E 9	.77325E 7	.38844E 6	.19493E 5
3.8	.35875E 10	.18698E 9	.94493E 7	.47565E 6	.23910E 5
4.6	.43364E 10	.22824E 9	.11572E 8	.58396E 6	.29415E 5
5.5	.52411E 10	.27913E 9	.14210E 8	.71920E 6	.36319E 5
6.7	.63337E 10	.34217E 9	.17504E 8	.88913E 6	.45038E 5
8.1	.76527E 10	.42062E 9	.21645E 8	.11043E 7	.56145E 5
9.8	.92443E 10	.51882E 9	.26890E 8	.13791E 7	.70437E 5
11.8	.11164E 11	.64254E 9	.33593E 8	.17340E 7	.89048E 5
14.3	.13477E 11	.79969E 9	.42253E 8	.21980E 7	.11362E 6
17.3	.16263E 11	.10011E 10	.53581E 8	.28135E 7	.14662E 6
20.9	.19613E 11	.12622E 10	.68618E 8	.36441E 7	.19175E 6
25.3	.23635E 11	.16046E 10	.88922E 8	.47876E 7	.25490E 6
30.6	.28455E 11	.20603E 10	.11688E 9	.63984E 7	.34553E 6
37.1	.34213E 11	.26764E 10	.15626E 9	.87278E 7	.47950E 6
44.8	.41064E 11	.35237E 10	.21315E 9	.12199E 8	.68428E 6
54.2	.49172E 11	.47102E 10	.29772E 9	.17551E 8	.10095E 7
65.5	.58691E 11	.64016E 10	.42742E 9	.26117E 8	.15485E 7
79.3	.69746E 11	.88509E 10	.63308E 9	.40408E 8	.24852E 7
95.9	.82397E 11	.12436E 11	.97057E 9	.65332E 8	.41998E 7
115.9	.96594E 11	.17693E 11	.15432E 10	.11086E 9	.75175E 7
140.2	.11215E 12	.25320E 11	.25450E 10	.19809E 9	.14326E 8
169.6	.12875E 12	.36100E 11	.43410E 10	.37337E 9	.29183E 8
205.1	.14599E 12	.50703E 11	.76063E 10	.74227E 9	.63718E 8
248.1	.16343E 12	.69396E 11	.13513E 11	.15510E 10	.14919E 9
300.0	.18062E 12	.91781E 11	.23810E 11	.33730E 10	.37304E 9

Table 29C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
1.2	.36724E	3	.25489E	2	.80490E	1	.72106E	1	.72106E	1
1.5	.44538E	3	.29513E	2	.80490E	1	.72106E	1	.72106E	1
1.8	.54146E	3	.34208E	2	.80490E	1	.72106E	1	.72106E	1
2.1	.65935E	3	.40245E	2	.90551E	1	.72106E	1	.72106E	1
2.6	.80473E	3	.46953E	2	.90551E	1	.72106E	1	.72106E	1
3.1	.98366E	3	.56511E	2	.98936E	1	.72106E	1	.72106E	1
3.8	.12072E	4	.67075E	2	.98936E	1	.72106E	1	.72106E	1
4.6	.14859E	4	.81832E	2	.11067E	2	.72106E	1	.72106E	1
5.5	.18380E	4	.99104E	2	.12074E	2	.72106E	1	.72106E	1
6.7	.22832E	4	.12241E	3	.13080E	2	.72106E	1	.72106E	1
8.1	.28540E	4	.15142E	3	.14924E	2	.72106E	1	.72106E	1
9.8	.35934E	4	.18898E	3	.16769E	2	.72106E	1	.72106E	1
11.8	.45640E	4	.23929E	3	.18781E	2	.80490E	1	.72106E	1
14.3	.58558E	4	.30704E	3	.22806E	2	.80490E	1	.72106E	1
17.3	.76095E	4	.40010E	3	.27333E	2	.80490E	1	.72106E	1
20.9	.10036E	5	.52973E	3	.34208E	2	.80490E	1	.72106E	1
25.3	.13480E	5	.71536E	3	.43934E	2	.90551E	1	.72106E	1
30.6	.18504E	5	.99137E	3	.59361E	2	.98936E	1	.72106E	1
37.1	.26072E	5	.14131E	4	.82502E	2	.11067E	2	.72106E	1
44.8	.37901E	5	.20859E	4	.12040E	3	.13080E	2	.72106E	1
54.2	.57177E	5	.32082E	4	.18530E	3	.16769E	2	.80490E	1
65.5	.90110E	5	.51784E	4	.30134E	3	.23812E	2	.80490E	1
79.3	.14943E	6	.88430E	4	.52302E	3	.37227E	2	.90551E	1
95.9	.26268E	6	.16111E	5	.97963E	3	.65398E	2	.11067E	2
115.9	.49310E	6	.31581E	5	.19918E	4	.13013E	3	.14924E	2
140.2	.99508E	6	.67150E	5	.44374E	4	.29463E	3	.25489E	2
169.6	.21714E	7	.15605E	6	.10922E	5	.75426E	3	.57349E	2
205.1	.51488E	7	.39902E	6	.29945E	5	.21950E	4	.16383E	3
248.1	.13304E	8	.11283E	7	.92073E	5	.72882E	4	.56829E	3
300.0	.37412E	8	.35319E	7	.31647E	6	.27676E	5	.23374E	4

Table 29D

1.00E+19 300.0 - 5.0E-21 * . + 7.8649983

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

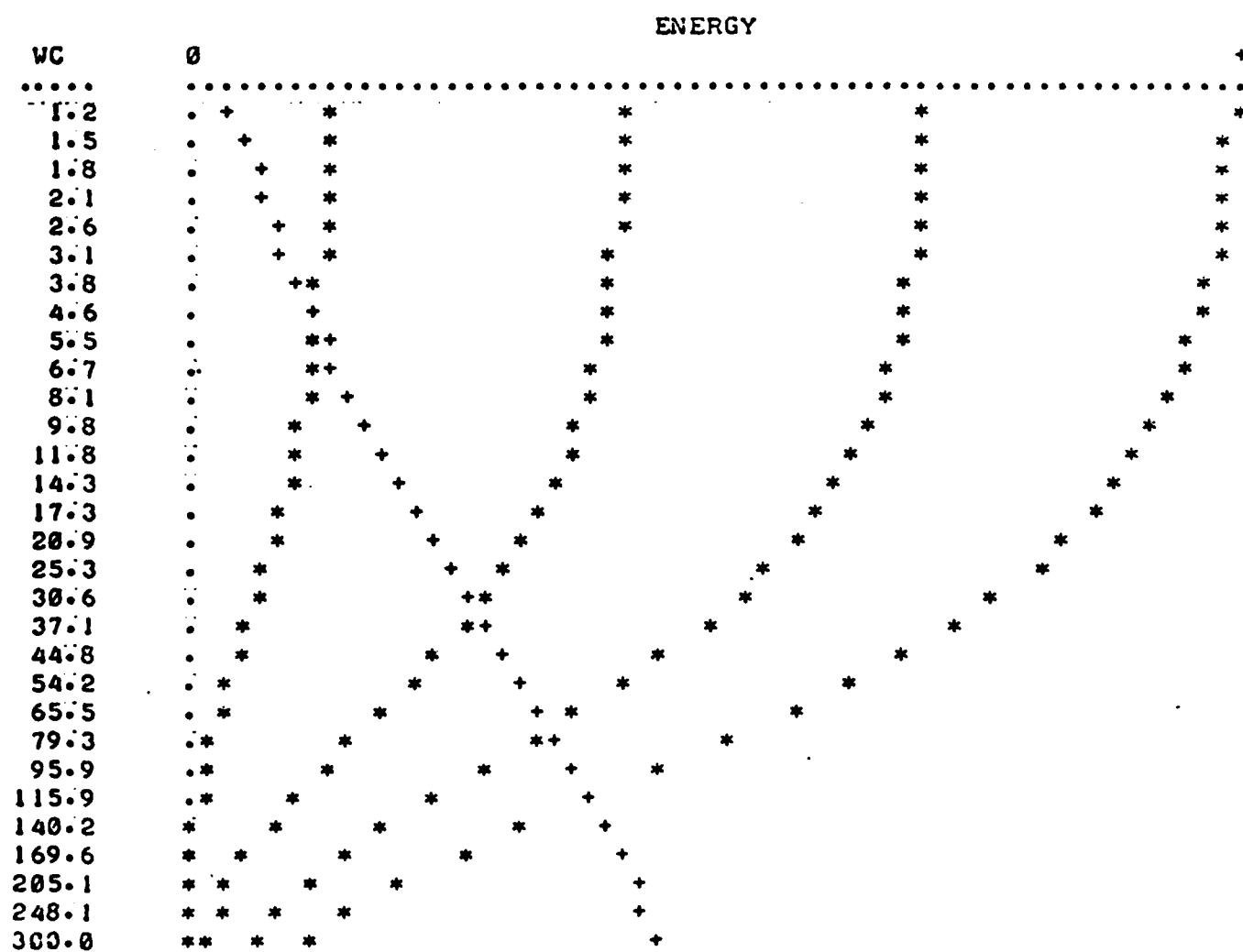


Figure 30

$W_c(A)$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	21.777	66.386	201.431	336.894	472.530	608.267
1.5	26.770	66.013	200.778	336.048	471.526	607.128
1.8	31.785	65.566	199.991	335.027	470.315	605.753
2.1	36.830	65.229	199.043	333.797	468.855	604.094
2.6	41.915	64.385	197.904	332.315	467.096	602.294
3.1	47.052	63.616	196.534	330.531	464.976	599.684
3.8	52.263	62.697	194.892	328.388	462.426	596.782
4.6	57.571	61.605	192.920	325.814	459.362	593.291
5.5	63.013	60.309	190.565	322.728	455.680	589.097
6.7	68.638	58.780	187.756	319.035	451.270	584.065
8.1	74.511	56.984	184.415	314.627	445.993	578.037
9.8	80.716	54.888	180.455	309.378	439.595	570.332
11.8	87.358	52.462	175.784	303.150	432.200	562.239
14.3	94.550	49.679	170.301	295.791	423.309	552.324
17.3	102.377	46.525	163.909	287.136	412.809	539.923
20.9	110.822	43.000	156.515	277.021	400.469	525.654
25.3	119.664	39.129	148.045	265.287	386.058	503.919
30.6	128.509	34.965	138.457	251.797	369.355	439.421
37.1	137.085	30.599	127.762	236.461	350.177	466.691
44.8	145.537	26.157	116.041	219.260	328.404	441.113
54.2	154.208	21.791	103.468	200.288	304.029	411.978
65.5	162.985	17.665	90.325	179.776	277.193	379.534
79.3	171.315	13.930	76.999	158.134	248.266	344.055
95.9	179.302	10.693	63.957	135.946	217.831	306.099
115.9	186.984	8.009	51.689	113.954	186.745	266.547
140.2	194.100	5.872	40.634	92.975	156.061	226.592
169.6	200.712	4.229	31.105	73.785	126.925	187.651
205.1	206.746	3.003	23.238	56.988	100.408	151.191
248.1	212.193	2.110	17.000	42.918	77.316	113.496
300.0	217.070	1.471	12.222	31.611	58.069	90.450

Table 30A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	744.073	879.930	1015.826	1151.754	1287.708
1.5	742.812	878.558	1014.352	1150.184	1286.048
1.8	741.290	876.902	1012.572	1148.288	1284.042
2.1	739.454	874.904	1010.424	1145.999	1281.621
2.6	737.239	872.493	1007.831	1143.237	1278.699
3.1	734.569	869.586	1004.705	1139.906	1275.174
3.8	731.353	866.083	1000.937	1135.889	1270.924
4.6	727.483	861.866	996.399	1131.051	1265.803
5.5	722.830	856.794	990.938	1125.228	1259.637
6.7	717.242	850.699	984.375	1118.225	1252.221
8.1	710.543	843.387	976.495	1109.815	1243.310
9.8	702.525	834.629	967.051	1099.729	1232.619
11.8	692.952	824.159	955.752	1087.655	1219.814
14.3	681.551	811.676	942.267	1073.232	1204.507
17.3	668.019	796.837	926.217	1056.050	1186.256
20.9	652.022	779.262	907.180	1035.644	1164.561
25.3	633.204	758.541	884.695	1011.507	1138.866
30.6	611.200	734.243	858.270	983.091	1108.571
37.1	585.657	705.942	827.409	949.832	1073.047
44.8	556.271	673.247	791.641	911.180	1031.672
54.2	522.834	635.854	750.567	866.651	983.874
65.5	485.292	593.610	703.936	815.893	929.209
79.3	443.825	546.594	651.726	758.785	867.452
95.9	398.923	495.213	594.253	695.544	798.723
115.9	351.453	440.289	532.273	626.851	723.616
140.2	302.677	383.110	467.067	553.956	643.334
169.6	254.203	325.411	400.454	478.724	559.760
205.1	207.823	269.248	334.693	403.573	475.433
248.1	165.263	216.735	272.241	331.254	393.355
300.0	127.890	169.715	215.389	264.477	316.620

Table 30B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.12023E 12	.70210E 9	.37163E 7	.19605E 5	.18511E 3
1.5	.14539E 12	.67342E 9	.46565E 7	.24712E 5	.20732E 3
1.8	.17579E 12	.10931E 10	.56340E 7	.31421E 5	.25175E 3
2.1	.21255E 12	.13791E 10	.75012E 7	.40393E 5	.29247E 3
2.6	.25697E 12	.17530E 10	.96712E 7	.52612E 5	.35726E 3
3.1	.31365E 12	.22542E 10	.12641E 8	.69642E 5	.45167E 3
3.6	.37548E 12	.29375E 10	.16803E 8	.94008E 5	.60346E 3
4.6	.45377E 12	.38965E 10	.22795E 8	.12997E 6	.88763E 3
5.5	.54824E 12	.52559E 10	.31707E 8	.18495E 6	.11366E 4
6.7	.65211E 12	.72742E 10	.45471E 8	.27267E 6	.16326E 4
8.1	.79918E 12	.10368E 11	.67686E 8	.41971E 6	.26119E 4
9.8	.96373E 12	.15313E 11	.10543E 9	.68034E 6	.43427E 4
11.8	.11664E 13	.23596E 11	.17348E 9	.11735E 7	.77598E 4
14.3	.13937E 13	.38141E 11	.30451E 9	.21921E 7	.15142E 5
17.3	.16666E 13	.64915E 11	.57630E 9	.44551E 7	.32640E 5
20.9	.19779E 13	.11566E 12	.11813E 10	.99572E 7	.78467E 5
25.3	.23195E 13	.21125E 12	.26166E 10	.24486E 8	.21103E 6
30.6	.26766E 13	.38104E 12	.61946E 10	.65820E 8	.63176E 6
37.1	.30366E 13	.65312E 12	.15528E 11	.19258E 9	.21051E 7
44.8	.33983E 13	.10413E 13	.41168E 11	.62204E 9	.79159E 7
54.2	.37659E 13	.15377E 13	.11407E 12	.22248E 10	.34185E 8
65.5	.41306E 13	.21063E 13	.30842E 12	.87854E 10	.16547E 9
79.3	.44723E 13	.26980E 13	.71966E 12	.36453E 11	.91734E 9
95.9	.47905E 13	.32849E 13	.13573E 13	.14937E 12	.54111E 10
115.9	.50846E 13	.38470E 13	.21167E 13	.51222E 12	.33026E 11
140.2	.53473E 13	.43612E 13	.26871E 13	.12322E 13	.18575E 12
169.6	.55816E 13	.48189E 13	.36109E 13	.21370E 13	.71753E 12
205.1	.57878E 13	.52133E 13	.42562E 13	.30325E 13	.16590E 13
248.1	.59678E 13	.55450E 13	.48094E 13	.38352E 13	.26838E 13
300.0	.61244E 13	.58191E 13	.52687E 13	.45181E 13	.36622E 13

Table 30C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6	N7	N8	N9	N10
1.2	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
1.5	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
1.8	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
2.1	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
2.6	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
3.1	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
3.6	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
4.6	.79597E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
5.5	.88853E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
6.7	.88853E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
8.1	.88853E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
9.8	.99959E 2	.79597E 2	.79597E 2	.79597E 2	.79597E 2
11.8	.13328E 3	.79597E 2	.79597E 2	.79597E 2	.79597E 2
14.3	.17771E 3	.79597E 2	.79597E 2	.79597E 2	.79597E 2
17.3	.30173E 3	.79597E 2	.79597E 2	.79597E 2	.79597E 2
20.9	.66640E 3	.79597E 2	.79597E 2	.79597E 2	.79597E 2
25.3	.18011E 4	.88853E 2	.79597E 2	.79597E 2	.79597E 2
30.6	.57514E 4	.13328E 3	.79597E 2	.79597E 2	.79597E 2
37.1	.21325E 5	.28137E 3	.79597E 2	.79597E 2	.79597E 2
44.8	.91959E 5	.10736E 4	.88853E 2	.79597E 2	.79597E 2
54.2	.46875E 6	.59846E 4	.15304E 3	.79597E 2	.79597E 2
65.5	.28138E 7	.42636E 5	.67750E 3	.88853E 2	.79597E 2
79.3	.19325E 8	.36238E 6	.62734E 4	.17771E 3	.79597E 2
95.9	.14959E 9	.36039E 7	.78124E 5	.16271E 4	.10921E 3
115.9	.12630E 10	.40631E 8	.11563E 7	.29842E 5	.78487E 3
140.2	.10911E 11	.48392E 9	.18987E 8	.65812E 6	.20792E 5
169.6	.87248E 11	.58667E 10	.32279E 9	.15619E 8	.67901E 6
205.1	.49369E 12	.62622E 11	.51764E 10	.36133E 9	.22406E 8
248.1	.14437E 13	.44714E 12	.68577E 11	.72899E 10	.65229E 9
300.0	.25561E 13	.14541E 13	.53309E 12	.10876E 12	.15424E 11

Table 30D

1.00E+19 77.0 1.0E-21 * . + 7.8649983

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

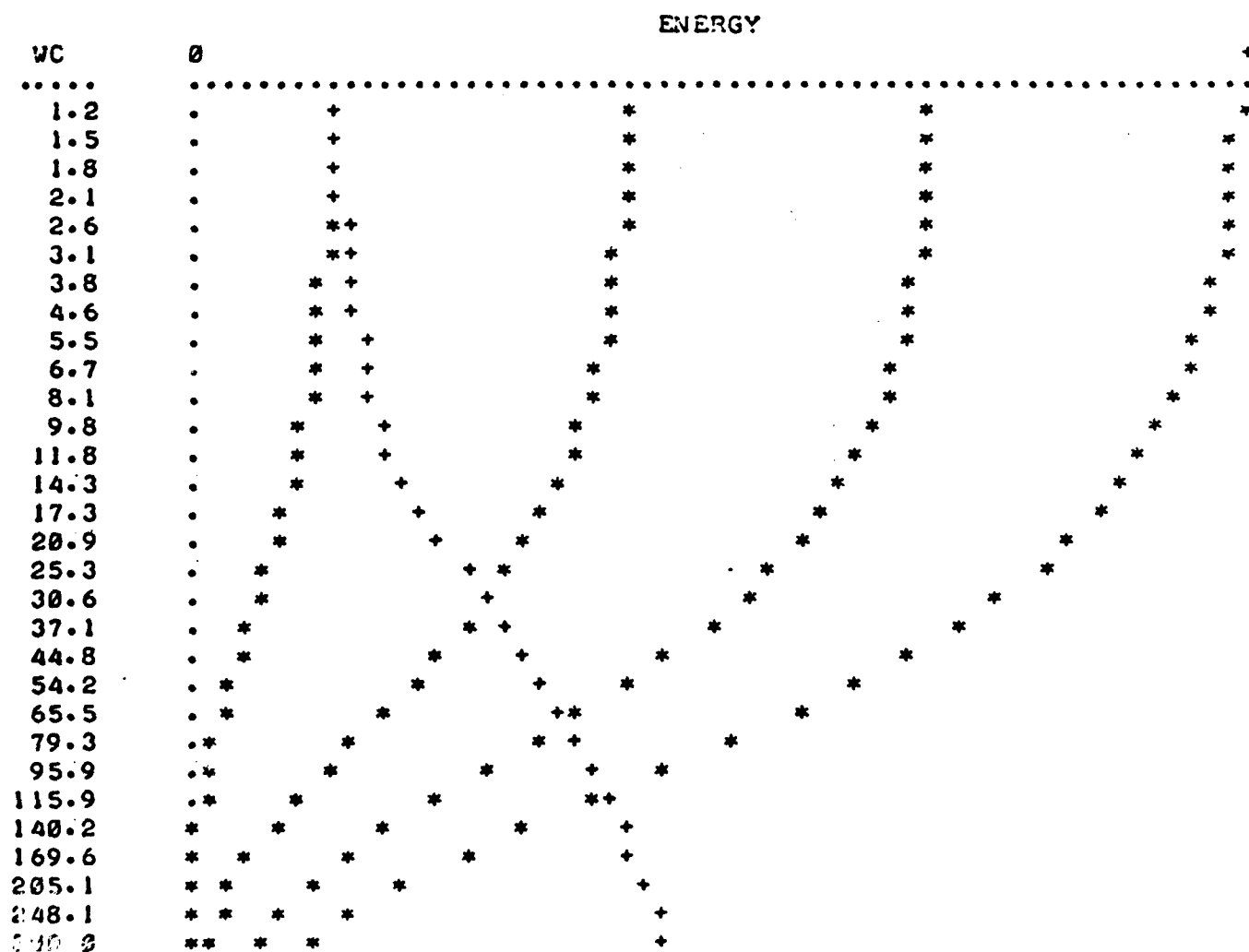


Figure 31

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	65.687	66.386	201.431	336.894	472.530	608.267
1.5	67.074	66.013	200.778	336.048	471.526	607.128
1.8	68.503	65.566	199.991	335.027	470.315	605.753
2.1	69.990	65.029	199.043	333.797	468.855	604.094
2.6	71.557	64.385	197.904	332.315	467.096	602.094
3.1	73.234	63.616	196.534	330.531	464.976	599.684
3.8	75.064	62.697	194.890	328.388	462.426	596.782
4.6	77.105	61.605	192.920	325.814	459.360	593.291
5.5	79.434	60.309	190.565	322.728	455.680	589.097
6.7	82.154	58.780	187.756	319.035	451.270	584.065
8.1	85.395	56.984	184.415	314.627	445.993	578.037
9.8	89.322	54.888	180.455	309.378	439.695	570.832
11.8	94.138	52.462	175.784	303.150	432.200	562.239
14.3	100.094	49.679	170.301	295.791	423.309	552.024
17.3	107.499	46.525	163.909	287.136	412.809	539.923
20.9	116.727	43.000	156.515	277.021	400.469	525.654
25.3	127.999	39.129	148.045	265.287	386.058	508.919
30.6	138.305	34.965	138.457	251.797	369.355	489.421
37.1	144.135	30.599	127.762	236.461	350.177	466.891
44.8	149.961	26.157	116.041	219.260	328.404	441.113
54.2	158.023	21.791	103.468	200.288	304.029	411.978
65.5	168.793	17.665	90.325	179.776	277.198	379.534
79.3	175.899	13.930	76.999	158.134	248.266	344.055
95.9	182.690	10.693	63.957	135.946	217.831	306.099
115.9	191.486	8.009	51.689	113.954	186.745	266.547
140.2	197.278	5.872	40.634	92.975	156.061	226.592
169.6	204.038	4.229	31.105	73.785	126.925	187.651
205.1	210.199	3.003	23.238	56.988	100.408	151.191
248.1	215.400	2.110	17.000	42.918	77.316	118.496
300.0	220.032	1.471	12.222	31.611	58.069	90.450

Table 31A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	744.073	879.930	1015.826	1151.754	1287.708
1.5	742.812	878.558	1014.352	1150.184	1286.048
1.8	741.290	876.902	1012.572	1148.288	1284.042
2.1	739.454	874.904	1010.424	1145.999	1281.621
2.6	737.239	872.493	1007.831	1143.237	1278.699
3.1	734.569	869.586	1004.705	1139.906	1275.174
3.8	731.353	866.083	1000.937	1135.889	1270.924
4.6	727.483	861.866	996.399	1131.051	1265.803
5.5	722.830	856.794	990.938	1125.228	1259.637
6.7	717.242	850.699	984.375	1118.225	1252.221
8.1	710.543	843.387	976.495	1109.815	1243.310
9.8	702.525	834.629	967.051	1099.729	1232.619
11.8	692.952	824.159	955.752	1087.655	1219.814
14.3	681.551	811.676	942.267	1073.232	1204.507
17.3	668.019	796.837	926.217	1056.050	1186.256
20.9	652.022	779.262	907.180	1035.644	1164.561
25.3	633.204	758.541	884.695	1011.507	1138.866
30.6	611.200	734.243	858.270	983.091	1108.571
37.1	585.657	705.942	827.409	949.832	1073.047
44.8	556.271	673.247	791.641	911.180	1031.672
54.2	522.834	635.854	750.567	866.651	983.874
65.5	485.292	593.610	703.936	815.893	929.209
79.3	443.825	546.594	651.726	758.785	867.452
95.9	398.923	495.213	594.253	695.544	798.723
115.9	351.453	440.289	532.273	626.851	723.616
140.2	302.677	383.110	467.067	553.956	643.334
169.6	254.203	325.411	400.454	478.724	559.760
205.1	207.823	269.248	334.693	403.573	475.433
248.1	165.263	216.735	272.241	331.254	393.356
300.0	127.890	169.715	215.389	264.477	316.620

Table 31B

ELECTRON CONCENTRATION/SQUARE CM.
WC IN ANGSTROMS

WC	N1	N2	N3	N4
1.2	.12094E 12	.26416E 3	.20430E 2	.20430E
1.5	.14327E 12	.35159E 3	.20430E 2	.20430E
1.8	.17689E 12	.43367E 3	.20430E 2	.20430E
2.1	.21394E 12	.53937E 3	.20430E 2	.20430E
2.6	.25873E 12	.10266E 4	.20430E 2	.20430E
3.1	.31291E 12	.16130E 4	.20430E 2	.20430E
3.8	.37644E 12	.27101E 4	.20430E 2	.20430E
4.6	.45769E 12	.49417E 4	.20430E 2	.20430E
5.5	.55353E 12	.99922E 4	.20430E 2	.20430E
6.7	.66943E 12	.22972E 5	.20430E 2	.20430E
8.1	.80962E 12	.61933E 5	.20430E 2	.20430E
9.8	.97915E 12	.20331E 6	.20430E 2	.20430E
11.8	.11842E 13	.84984E 6	.20430E 2	.20430E
14.3	.14322E 13	.47670E 7	.20430E 2	.20430E
17.3	.17320E 13	.38157E 8	.20430E 2	.20430E
20.9	.20943E 13	.46717E 9	.25556E 2	.20430E
25.3	.25244E 13	.89536E 10	.21192E 3	.20430E
30.6	.29354E 13	.12844E 12	.72065E 4	.20430E
37.1	.32251E 13	.48041E 12	.16986E 5	.20430E
44.8	.35167E 13	.96460E 12	.54364E 7	.20430E
54.2	.38698E 13	.15497E 13	.32170E 9	.72218E 2
65.5	.42929E 13	.22289E 13	.32920E 11	.15062E 5
79.3	.46069E 13	.28093E 13	.51715E 12	.34424E 7
95.9	.48857E 13	.33727E 13	.13280E 13	.94805E 9
115.9	.52118E 13	.39710E 13	.22023E 13	.20972E 12
140.2	.54370E 13	.44496E 13	.29626E 13	.11712E 13
169.6	.56757E 13	.49123E 13	.37000E 13	.21905E 13
205.1	.58856E 13	.53128E 13	.43521E 13	.31167E 13
248.1	.60587E 13	.56357E 13	.48995E 13	.39224E 13
300.0	.62084E 13	.59030E 13	.53522E 13	.46207E 13

Table 31C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6	N7	N8	N9
1.2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
1.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2
1.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2
2.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2
2.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2
3.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2
3.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2
4.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2
5.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2
6.7	.20430E 2	.20430E 2	.20430E 2	.20430E 2
8.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2
9.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2
11.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2
14.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2
17.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2
20.9	.20430E 2	.20430E 2	.20430E 2	.20430E 2
25.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2
30.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2
37.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2
44.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2
54.2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
65.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2
79.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2
95.9	.20430E 2	.20430E 2	.20430E 2	.20430E 2
115.9	.25656E 2	.20430E 2	.20430E 2	.20430E 2
140.2	.23687E 5	.20430E 2	.20430E 2	.20430E 2
169.6	.97833E 8	.21508E 4	.20430E 2	.20430E 2
205.1	.16735E 12	.25636E 8	.13498E 4	.20430E 2
248.1	.14243E 13	.11258E 12	.35759E 8	.49117E 4
300.0	.26174E 13	.14294E 13	.20786E 12	.23164E 9

Table 31D

STOP

1.00E+19 4.2 10.0E-21 * . + 7.8649983

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 20/CUBIC CENTIMETER
TEMPERATURE = 4.2DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

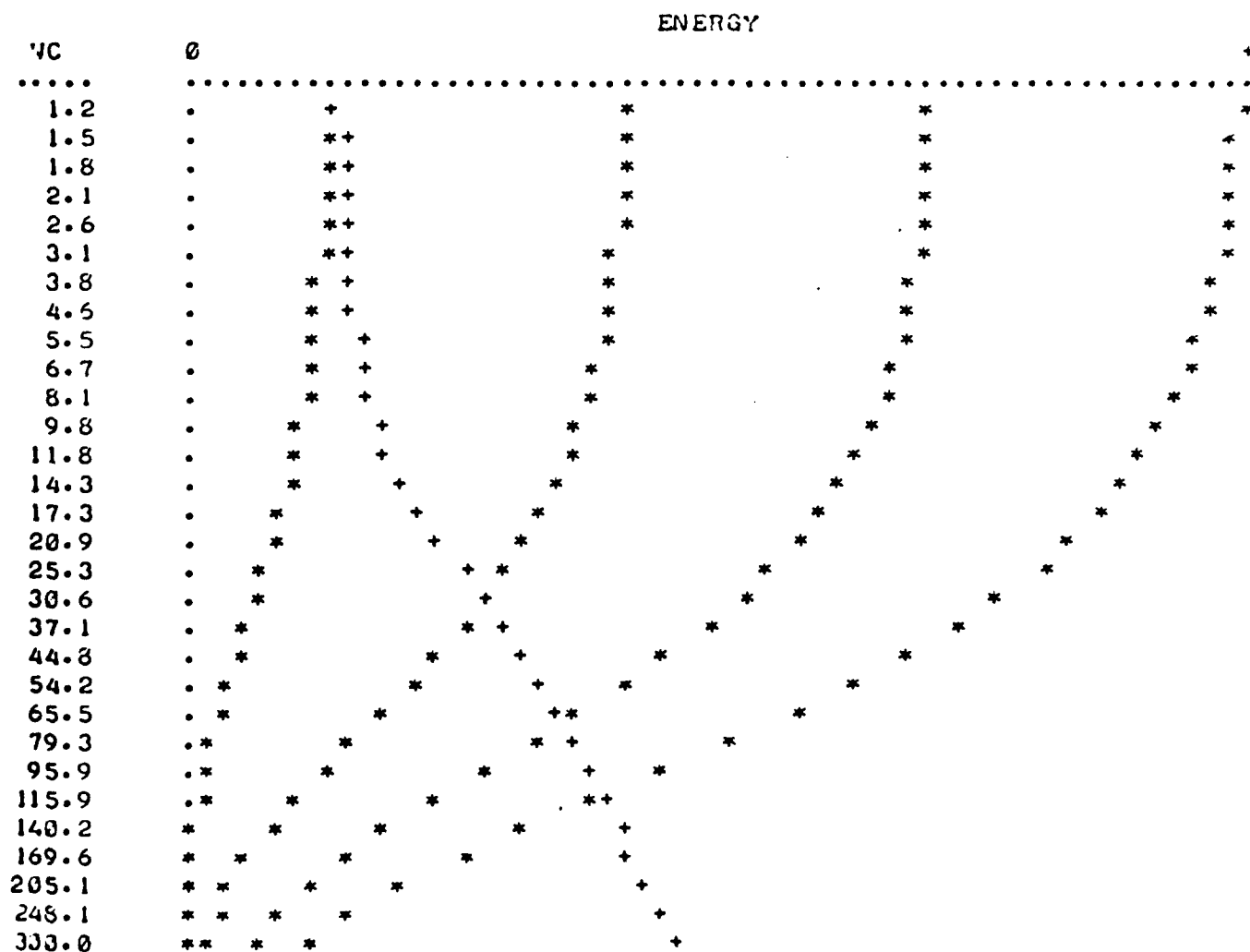


Figure 32

W (Å)	E _f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	70.643	65.386	201.431	336.694	472.533	503.237
1.5	71.153	66.013	200.776	335.348	471.523	507.113
1.8	71.793	65.566	199.991	335.027	470.315	505.753
2.1	72.560	65.029	199.043	333.797	468.855	504.394
2.6	73.494	64.385	197.904	332.315	467.096	502.394
3.1	74.632	63.616	196.534	330.531	464.976	500.634
3.8	76.020	62.697	194.890	328.386	462.426	506.782
4.6	77.717	61.605	192.920	325.814	459.330	503.291
5.5	79.796	60.309	190.565	322.728	455.680	509.097
6.7	82.347	58.780	187.756	319.035	451.270	504.065
8.1	85.486	56.984	184.415	314.627	445.993	507.037
9.8	89.359	54.888	180.455	309.378	439.695	502.332
11.8	94.150	52.462	175.784	303.150	432.200	502.239
14.3	100.097	49.679	170.301	295.791	423.309	502.324
17.3	107.500	46.525	163.909	287.136	412.809	509.923
20.9	116.744	43.000	156.515	277.021	400.469	505.354
25.3	128.314	39.129	148.045	265.287	386.056	508.919
30.6	140.642	34.965	138.457	251.797	369.355	489.421
37.1	144.405	30.599	127.762	236.461	352.177	466.391
44.8	149.981	26.157	116.041	219.260	323.404	441.113
54.2	158.029	21.791	103.463	200.288	304.029	411.978
65.5	169.372	17.665	90.325	179.776	277.193	379.534
79.3	176.046	13.930	76.999	158.134	243.266	344.035
95.9	182.703	10.593	63.957	135.946	217.831	306.099
115.9	192.147	8.009	51.689	113.954	186.745	266.347
140.2	197.302	5.872	40.634	92.975	156.061	226.592
169.6	204.147	4.229	31.105	73.785	126.925	137.651
205.1	210.735	3.003	23.238	56.988	100.403	151.191
248.1	216.052	2.110	17.000	42.918	77.316	118.403
300.0	220.363	1.471	12.222	31.611	53.069	90.450

Table 32A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ÅNGSTRÖMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	744.073	879.930	1015.826	1151.754	1287.703
1.5	742.812	878.558	1014.352	1150.184	1286.048
1.8	741.290	876.902	1012.572	1148.288	1284.042
2.1	739.454	874.904	1010.424	1145.999	1281.621
2.6	737.239	872.493	1007.831	1143.237	1278.699
3.1	734.569	869.586	1004.705	1139.906	1275.174
3.8	731.353	866.083	1000.937	1135.889	1270.924
4.6	727.483	861.866	996.399	1131.051	1265.803
5.5	722.830	856.794	990.938	1125.228	1259.637
6.7	717.242	850.699	984.375	1118.225	1252.221
8.1	710.543	843.387	976.495	1109.815	1243.310
9.8	702.525	834.629	967.051	1099.729	1232.619
11.8	692.952	824.159	955.752	1087.655	1219.814
14.3	681.551	811.676	942.267	1073.232	1204.507
17.3	668.019	796.837	926.217	1056.050	1186.256
20.9	652.022	779.262	907.180	1035.644	1164.561
25.3	633.204	758.541	884.695	1011.507	1138.866
30.6	611.200	734.243	858.270	983.091	1108.571
37.1	585.657	705.942	827.409	949.832	1073.047
44.8	556.271	673.247	791.641	911.180	1031.672
54.2	522.834	635.854	750.567	866.651	983.874
65.5	485.292	593.610	703.936	815.893	929.209
79.3	443.825	546.594	651.726	758.785	867.452
95.9	398.923	495.213	594.253	695.544	798.723
115.9	351.453	440.289	532.273	626.851	723.616
140.2	302.677	383.110	467.067	553.956	643.334
169.6	254.203	325.411	400.454	478.724	559.760
205.1	207.823	269.248	334.693	403.573	475.433
248.1	165.263	216.735	272.241	331.254	393.356
300.0	127.890	169.715	215.389	264.477	316.620

Table 32B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.12094E 12	.30000E 0	.00000E 0	.00000E 0	.00000E 0
1.5	.14627E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.8	.17639E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.1	.21394E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.6	.25874E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.1	.31291E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.8	.37844E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
4.6	.45769E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
5.5	.55352E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
6.7	.66943E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
8.1	.80962E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
9.8	.97915E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
11.8	.11842E 13	.00000E 0	.00000E 0	.00000E 0	.00000E 0
14.3	.14322E 13	.00000E 0	.00000E 0	.00000E 0	.00000E 0
17.3	.17321E 13	.11144E 1	.00000E 0	.00000E 0	.00000E 0
20.9	.20947E 13	.11144E 1	.00000E 0	.00000E 0	.00000E 0
25.3	.25334E 13	.11144E 1	.00000E 0	.00000E 0	.00000E 0
30.6	.30018E 13	.62069E 11	.00000E 0	.00000E 0	.00000E 0
37.1	.32327E 13	.47275E 12	.00000E 0	.00000E 0	.00000E 0
44.8	.35173E 13	.96410E 12	.00000E 0	.00000E 0	.00000E 0
54.2	.38700E 13	.15499E 13	.11144E 1	.00000E 0	.00000E 0
65.5	.43093E 13	.22454E 13	.11144E 1	.00000E 0	.00000E 0
79.3	.46050E 13	.28135E 13	.50881E 12	.00000E 0	.00000E 0
95.9	.48861E 13	.33731E 13	.13282E 13	.11144E 1	.00000E 0
115.9	.52306E 13	.39898E 13	.22211E 13	.15344E 12	.00000E 0
140.2	.54377E 13	.44503E 13	.29635E 13	.11715E 13	.11144E 1
169.6	.56788E 13	.49154E 13	.37030E 13	.21935E 13	.46857E 12
205.1	.59022E 13	.53274E 13	.43687E 13	.31354E 13	.16928E 13
248.1	.60772E 13	.56542E 13	.49180E 13	.39409E 13	.27711E 13
300.0	.62179E 13	.59125E 13	.53618E 13	.46102E 13	.36904E 13

Table 32C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6	N7	N8	N9	N10
1.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
4.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
5.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
6.7	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
8.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
9.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
11.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
14.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
17.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
20.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
25.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
30.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
37.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
44.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
54.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
65.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
79.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
95.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
115.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
140.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
169.6	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
205.1	.84144E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
248.1	.14427E 13	.14496E 10	.11144E 1	.00000E 0	.00000E 0
300.0	.26269E 13	.14388E 13	.14143E 12	.11144E 1	.00000E 0

Table 32D

5.00E+18 300.0 -12.0E-21 * . + 5.9511116

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER
TEMPERATURE =300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

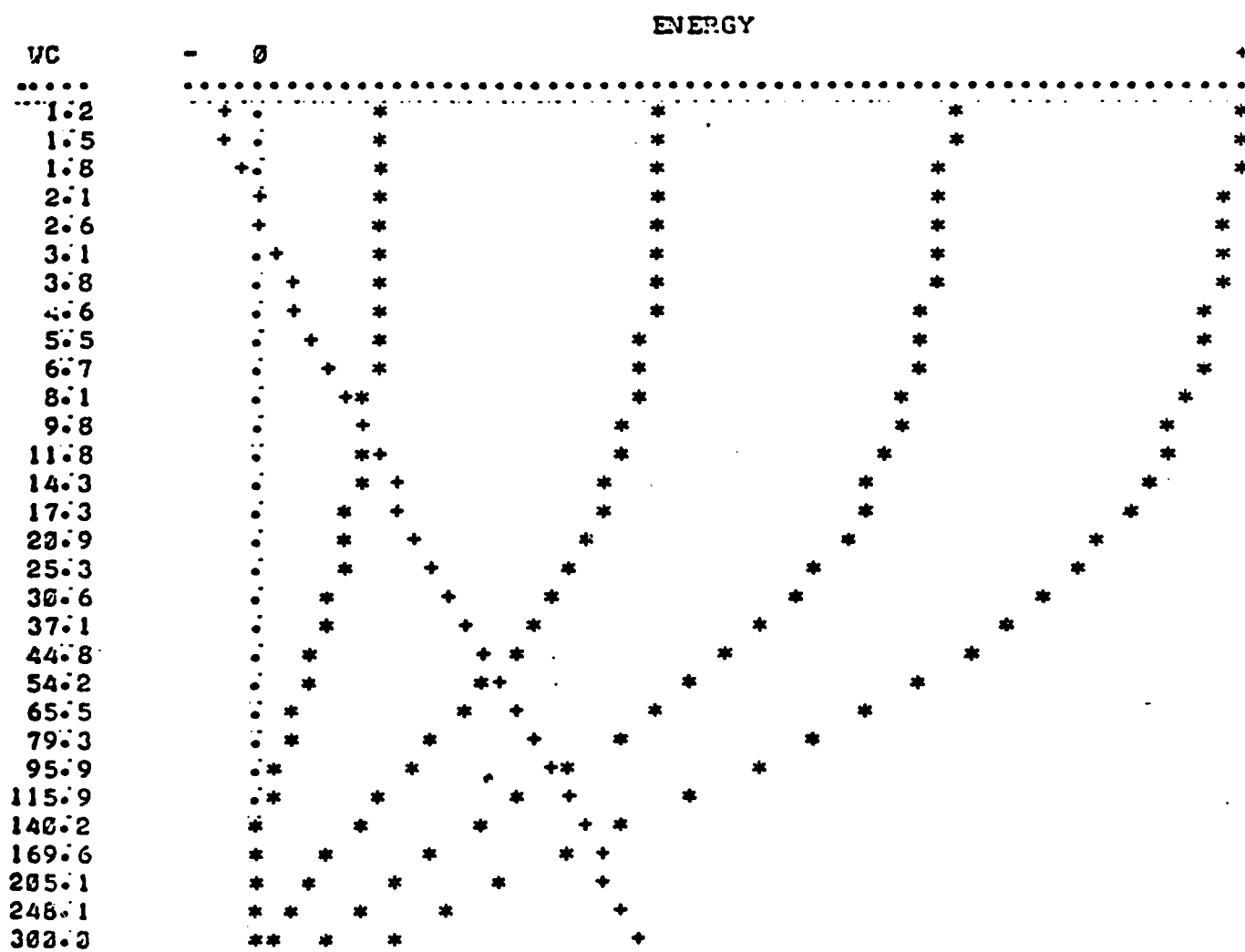


Figure 33

$W_c(\text{\AA})$	E_F	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-17.000	47.143	142.785	238.676	334.669	432.723
1.5	-12.122	46.920	142.396	238.171	334.271	432.344
1.8	-7.199	46.653	141.926	237.563	333.353	429.225
2.1	-2.302	46.331	141.361	236.829	332.479	428.236
2.6	2.631	45.945	143.679	235.945	331.433	427.044
3.1	7.505	45.483	139.862	234.980	330.165	425.635
3.6	12.414	44.930	138.876	233.598	328.641	423.374
4.6	17.333	44.272	137.694	232.257	326.528	421.752
5.5	22.263	43.486	136.279	230.237	324.505	419.279
6.7	27.233	42.556	134.588	227.990	321.961	416.265
8.1	32.232	41.459	132.573	225.338	318.792	412.549
9.8	37.293	40.171	130.171	222.171	315.031	408.319
11.8	42.437	38.670	127.330	218.403	310.473	403.143
14.3	47.695	36.932	123.979	213.933	305.096	396.972
17.3	53.123	34.942	120.348	208.652	298.716	389.639
20.9	58.680	32.688	115.468	202.446	291.182	382.955
25.3	64.445	30.173	110.174	195.196	282.333	375.719
30.6	70.365	27.415	104.115	186.792	272.035	368.721
37.1	76.365	24.455	97.266	177.143	260.245	361.751
44.8	82.348	21.360	89.635	166.178	246.324	353.822
54.2	88.254	18.219	81.268	153.981	230.764	345.186
65.5	94.080	15.142	72.352	140.381	213.368	335.973
79.3	99.809	12.245	63.235	125.793	194.251	326.231
95.9	105.345	9.632	53.617	110.436	173.682	315.969
115.9	110.639	7.377	44.429	94.737	152.392	304.282
140.2	115.576	5.514	35.819	79.227	132.124	291.973
169.6	120.190	4.036	28.090	64.483	108.471	278.742
205.1	124.427	2.932	21.454	51.348	88.004	264.325
248.1	128.273	2.059	15.996	39.336	69.449	249.741
308.0	131.729	1.445	11.682	29.562	53.353	21.694

Table 33A

ENERGY IN MILLI-ELECTRON VOLTS
VC IN ANGSTROMS

VC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	526.818	622.942	719.091	815.258	911.441
1.5	526.067	622.126	718.213	814.323	910.452
1.8	525.160	621.140	717.153	813.194	909.258
2.1	524.066	619.949	715.873	811.831	907.816
2.6	522.746	618.512	714.328	810.185	906.075
3.1	521.153	616.779	712.465	808.199	903.975
3.6	519.234	614.689	710.217	805.804	901.440
4.6	516.922	612.171	707.508	802.917	898.395
5.5	514.140	609.140	704.246	799.439	894.704
6.7	510.796	605.494	700.322	795.253	890.272
8.1	506.781	601.114	695.604	790.221	884.941
9.8	501.967	595.860	689.942	784.177	878.538
11.8	496.208	589.568	683.157	775.930	870.856
14.3	489.332	582.048	675.040	766.256	861.656
17.3	481.146	573.084	665.356	757.397	850.661
20.9	471.433	562.431	653.832	745.559	837.555
25.3	459.955	549.818	640.169	730.912	821.980
30.6	446.459	534.954	624.036	713.592	803.543
37.1	430.688	517.534	605.087	693.212	781.829
44.8	412.394	497.258	582.971	669.371	756.341
54.2	391.366	473.852	557.357	641.685	726.697
65.5	367.465	447.110	527.971	609.816	692.480
79.3	340.665	416.935	494.646	573.528	653.385
95.9	311.110	383.400	457.385	532.752	609.273
115.9	279.171	346.819	416.436	487.667	560.251
140.2	245.482	307.799	372.366	438.789	506.776
169.6	210.962	267.281	326.113	387.033	449.742
205.1	176.765	226.517	278.996	333.773	390.521
248.1	144.162	186.973	232.633	280.733	330.945
308.0	114.359	150.137	188.761	229.866	273.155

Table 33B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N1	N2	N3	N4	N5
1.2	.58918E 11	.15137E 10	.37073E 8	.90337E 6	.22041E 5
1.5	.71229E 11	.18572E 10	.45593E 8	.11176E 7	.27328E 5
1.8	.86104E 11	.22654E 10	.56548E 8	.13391E 7	.34051E 5
2.1	.12437E 12	.28226E 10	.70322E 8	.17366E 7	.42788E 5
2.6	.12573E 12	.35215E 10	.87965E 8	.21562E 7	.54132E 5
3.1	.15196E 12	.43669E 10	.11082E 9	.27756E 7	.69172E 5
3.8	.18359E 12	.54814E 10	.14351E 9	.35603E 7	.89416E 5
4.6	.22172E 12	.69339E 10	.18379E 9	.46233E 7	.11723E 6
5.5	.26767E 12	.85539E 10	.23537E 9	.63938E 7	.15634E 6
6.7	.32296E 12	.11434E 11	.31333E 9	.81793E 7	.21284E 6
8.1	.38941E 12	.14966E 11	.41726E 9	.11221E 8	.29726E 6
9.8	.46923E 12	.19925E 11	.57363E 9	.15204E 8	.42719E 6
11.8	.56428E 12	.26982E 11	.80973E 9	.22973E 8	.63683E 6
14.3	.67748E 12	.37382E 11	.11795E 10	.34675E 8	.99397E 6
17.3	.81112E 12	.53272E 11	.17828E 10	.54711E 8	.16223E 7
20.9	.96714E 12	.77327E 11	.28111E 10	.92876E 8	.28173E 7
25.3	.11464E 13	.11552E 12	.46457E 10	.15996E 9	.52225E 7
30.6	.13476E 13	.17598E 12	.80579E 10	.29994E 9	.12463E 8
37.1	.15670E 13	.27243E 12	.14717E 11	.60086E 9	.22669E 8
44.8	.17937E 13	.41262E 12	.28394E 11	.12874E 10	.53337E 8
54.2	.20367E 13	.61441E 12	.55713E 11	.29528E 10	.13650E 9
65.5	.22761E 13	.68046E 12	.11317E 12	.72266E 10	.35341E 9
79.3	.25117E 13	.12331E 13	.22238E 12	.16752E 11	.11712E 10
95.9	.27367E 13	.15624E 13	.44237E 12	.50393E 11	.38494E 10
115.9	.29458E 13	.19345E 13	.75033E 12	.13436E 12	.13312E 11
143.2	.31367E 13	.22984E 13	.11934E 13	.33112E 12	.46648E 11
169.6	.33076E 13	.26367E 13	.16629E 13	.69398E 12	.15426E 12
205.1	.34586E 13	.29386E 13	.21261E 13	.11951E 13	.42959E 12
248.1	.35937E 13	.31988E 13	.25495E 13	.17427E 13	.91563E 12
300.0	.37055E 13	.34171E 13	.29161E 13	.22629E 13	.15152E 13

Table 33C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N6	N7	N8	N9	N10
1.2	.61457E 3	.88853E 2	.79597E 2	.79597E 2	.79597E 2
1.5	.74844E 3	.99959E 2	.79597E 2	.79597E 2	.79597E 2
1.8	.91074E 3	.99959E 2	.79597E 2	.79597E 2	.79597E 2
2.1	.11255E 4	.99959E 2	.79597E 2	.79597E 2	.79597E 2
2.6	.14142E 4	.10921E 3	.79597E 2	.79597E 2	.79597E 2
3.1	.17900E 4	.12217E 3	.79597E 2	.79597E 2	.79597E 2
3.8	.23120E 4	.13328E 3	.79597E 2	.79597E 2	.79597E 2
4.6	.30284E 4	.15364E 3	.79597E 2	.79597E 2	.79597E 2
5.5	.40539E 4	.17771E 3	.79597E 2	.79597E 2	.79597E 2
6.7	.55700E 4	.21643E 3	.79597E 2	.79597E 2	.79597E 2
8.1	.78561E 4	.28137E 3	.79597E 2	.79597E 2	.79597E 2
9.8	.11477E 5	.37762E 3	.88853E 2	.79597E 2	.79597E 2
11.8	.17460E 5	.54793E 3	.88853E 2	.79597E 2	.79597E 2
14.3	.27874E 5	.84780E 3	.99959E 2	.79597E 2	.79597E 2
17.3	.47103E 5	.14142E 4	.12217E 3	.79597E 2	.79597E 2
20.9	.85058E 5	.25897E 4	.15364E 3	.79597E 2	.79597E 2
25.3	.16569E 6	.51960E 4	.23879E 3	.79597E 2	.79597E 2
30.6	.35112E 6	.11510E 5	.44426E 3	.88853E 2	.79597E 2
37.1	.81523E 6	.28377E 5	.13292E 4	.13921E 3	.79597E 2
44.8	.20857E 7	.78253E 5	.29381E 4	.17771E 3	.79597E 2
54.2	.59130E 7	.24310E 6	.96831E 4	.44426E 3	.86853E 2
65.5	.18682E 8	.85733E 6	.37565E 5	.16634E 4	.14439E 3
79.3	.65777E 8	.34334E 7	.17025E 6	.91115E 4	.44426E 3
95.9	.25569E 9	.15593E 8	.39350E 6	.48277E 5	.25785E 4
115.9	.10782E 10	.78731E 8	.53239E 7	.33827E 6	.20473E 5
143.2	.47997E 10	.43177E 9	.35526E 8	.27160E 7	.17572E 6
169.6	.21572E 11	.24723E 10	.25414E 9	.24050E 8	.21253E 7
205.1	.90991E 11	.13994E 11	.16519E 10	.22262E 9	.24771E 8
248.1	.31731E 12	.72074E 11	.12526E 11	.20394E 10	.28823E 9
300.0	.79623E 12	.29299E 12	.76636E 11	.16282E 11	.30773E 10

Table 33D

5.00E+18 77.0 1.0E-21 * . + 5.5621317

NGAAS.

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

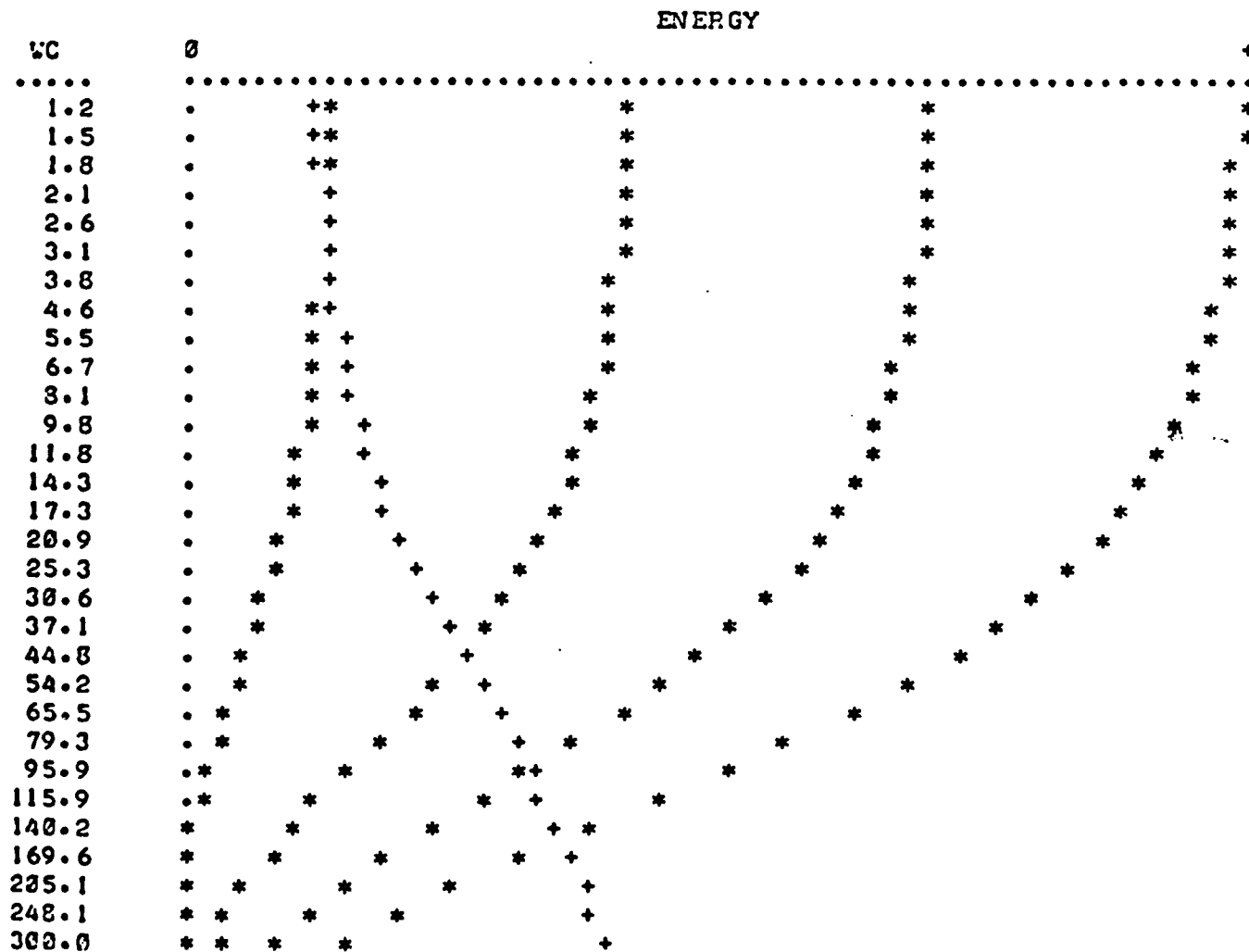


Figure 34

$W_c (\text{\AA})$	E_t	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	40.697	47.143	142.755	233.676	334.669	433.723
1.5	41.972	46.920	142.396	233.171	334.071	430.244
1.8	43.254	46.653	141.926	237.563	333.350	429.225
2.1	44.548	46.331	141.361	236.829	332.479	423.236
2.6	45.358	45.945	140.679	235.945	331.430	427.244
3.1	47.194	45.483	139.860	234.860	330.165	425.606
3.8	48.565	44.930	138.876	233.598	328.641	423.874
4.6	49.991	44.270	137.694	232.057	326.308	421.780
5.5	51.494	43.486	136.279	230.207	324.605	419.279
6.7	53.110	42.556	134.588	227.990	321.961	416.265
8.1	54.867	41.459	132.570	225.338	318.792	412.649
9.8	56.394	40.171	130.171	222.171	315.001	408.319
11.8	59.221	38.670	127.330	218.403	310.478	403.143
14.3	61.991	36.932	123.979	213.933	305.096	396.972
17.3	65.360	34.942	120.048	208.652	298.716	389.639
20.9	69.528	32.688	115.463	202.446	291.182	380.955
25.3	74.726	30.173	110.174	195.196	282.333	370.719
30.6	81.139	27.415	104.115	186.792	272.005	358.721
37.1	88.177	24.455	97.266	177.140	260.045	344.751
44.8	93.460	21.360	89.635	166.173	246.324	328.622
54.2	97.163	18.219	81.288	153.901	230.764	310.136
65.5	101.385	15.142	72.352	140.381	213.360	289.373
79.3	107.209	12.245	63.035	125.793	194.251	266.231
95.9	113.000	9.632	53.617	110.436	173.683	240.969
115.9	116.790	7.377	44.429	94.737	152.092	214.002
140.2	121.697	5.514	35.819	79.227	130.104	185.973
169.6	125.768	4.036	28.090	64.483	108.471	157.742
205.1	129.996	2.902	21.454	51.043	85.004	130.322
248.1	133.386	2.059	15.996	39.336	69.449	104.741
300.0	136.553	1.445	11.682	29.562	53.353	81.894

Table 34A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN Å. UNITS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	526.818	622.942	719.091	815.258	911.441
1.5	526.067	622.126	718.213	814.323	910.452
1.8	525.160	621.140	717.153	813.194	909.258
2.1	524.066	619.949	715.873	811.831	907.816
2.6	522.746	618.512	714.328	810.185	906.075
3.1	521.153	616.779	712.465	808.199	903.975
3.8	519.234	614.689	710.217	805.804	901.440
4.6	516.922	612.171	707.508	802.917	898.385
5.5	514.140	609.140	704.246	799.439	894.704
6.7	510.796	605.494	700.322	795.253	890.272
8.1	506.781	601.114	695.604	790.221	884.941
9.8	501.967	595.860	689.942	784.177	878.538
11.8	496.208	589.568	683.157	776.930	870.856
14.3	489.332	582.048	675.040	768.256	861.656
17.3	481.146	573.084	665.356	757.897	850.661
20.9	471.433	562.431	653.832	745.559	837.555
25.3	459.955	549.818	640.169	730.912	821.980
30.6	446.459	534.954	624.036	713.592	803.540
37.1	430.688	517.534	605.087	693.212	781.809
44.8	412.394	497.252	582.971	660.371	756.341
54.2	391.366	473.852	557.357	641.685	726.697
65.5	367.465	447.110	527.971	609.816	692.480
79.3	340.665	416.935	494.646	573.528	653.385
95.9	311.110	383.400	457.385	532.752	609.273
115.9	279.171	346.819	416.436	487.667	560.251
140.2	245.432	307.799	372.366	438.789	506.778
169.6	210.962	267.281	326.113	387.038	449.742
205.1	176.765	226.517	278.996	333.773	390.521
248.1	144.162	186.973	232.633	280.730	330.945
300.0	114.359	150.107	183.761	229.866	273.155

Table 34B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.63472E 11	.39286E 5	.23433E 2	.20430E 2	.20430E 2
1.5	.73133E 11	.52121E 5	.22430E 2	.20430E 2	.20430E 2
1.8	.88447E 11	.65264E 5	.20430E 2	.20430E 2	.20430E 2
2.1	.10697E 12	.86376E 5	.20430E 2	.20430E 2	.20430E 2
2.6	.12937E 12	.11661E 6	.23430E 2	.20430E 2	.20430E 2
3.1	.15646E 12	.16136E 6	.20430E 2	.20430E 2	.20430E 2
3.8	.18922E 12	.23018E 6	.23430E 2	.20430E 2	.20430E 2
4.6	.22884E 12	.34098E 6	.20430E 2	.20430E 2	.20430E 2
5.5	.27676E 12	.52942E 6	.20430E 2	.20430E 2	.20430E 2
6.7	.33472E 12	.87163E 6	.20430E 2	.20430E 2	.20430E 2
8.1	.40481E 12	.15446E 7	.20430E 2	.20430E 2	.20430E 2
9.8	.48957E 12	.30008E 7	.22036E 2	.20430E 2	.20430E 2
11.8	.59289E 12	.65411E 7	.28232E 2	.20430E 2	.20430E 2
14.3	.71626E 12	.16459E 8	.42285E 2	.20430E 2	.20430E 2
17.3	.86598E 12	.49475E 8	.99774E 2	.20430E 2	.20430E 2
20.9	.10472E 13	.18492E 9	.39387E 3	.20430E 2	.20430E 2
25.3	.12658E 13	.89771E 9	.24606E 4	.20430E 2	.20430E 2
30.6	.15261E 13	.58083E 10	.22794E 5	.20430E 2	.20430E 2
37.1	.18121E 13	.42655E 11	.28232E 6	.20430E 2	.20430E 2
44.8	.20481E 13	.19264E 12	.32646E 7	.39435E 2	.20430E 2
54.2	.22425E 13	.46741E 12	.36316E 8	.35729E 3	.20430E 2
65.5	.24498E 13	.82704E 12	.52631E 9	.87915E 4	.20430E 2
79.3	.26975E 13	.12550E 13	.11134E 11	.37672E 6	.28232E 2
95.9	.29363E 13	.16869E 13	.17251E 12	.23050E 8	.80772E 3
115.9	.31380E 13	.20555E 13	.63309E 12	.91768E 9	.81333E 5
140.2	.33059E 13	.24451E 13	.12124E 13	.40025E 11	.12315E 8
169.6	.34579E 13	.27746E 13	.17409E 13	.52475E 12	.15133E 12
205.1	.36122E 13	.30832E 13	.22426E 13	.11931E 13	.12665E 12
248.1	.37304E 13	.33345E 13	.26716E 13	.18162E 13	.81616E 12
300.0	.38378E 13	.35471E 13	.30302E 13	.23634E 13	.15527E 13

Table 34C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6	N7	N8	N9	N10
1.2	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
1.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
1.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
2.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
2.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
3.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
3.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
4.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
5.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
6.7	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
8.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
9.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
11.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
14.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
17.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
20.9	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
25.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
30.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
37.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
44.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
54.2	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
65.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
79.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
95.9	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
115.9	.25656E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
140.2	.15446E 4	.20430E 2	.20430E 2	.20430E 2	.20430E 2
169.6	.49778E 6	.12163E 3	.20430E 2	.20430E 2	.20430E 2
205.1	.16319E 9	.90252E 5	.53213E 2	.20430E 2	.20430E 2
248.1	.33876E 11	.58400E 8	.59848E 5	.61290E 2	.20430E 2
300.0	.63697E 12	.22861E 11	.71693E 8	.14639E 6	.23376E 3

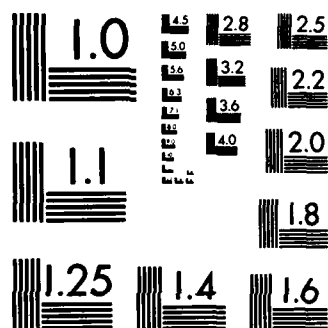
Table 34D

STOP

AD-A132 363

SUBBANDING CHARGE TRANSPORT AND RELATED APPLICATIONS IN SEMICONDUCTOR DEVICES(U) HAWAII UNIV AT MANOA HONOLULU DEPT OF ELECTRICAL ENGINEERING. J W HOLM-KENNEDY OCT 77 N00014-76-C-1081 F/G 9/1 NL

UNCLASSIFIED



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

5.00E+18 4.2 1.0E-21 * . + 5.5621317

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .5E 19/CUBIC CENTIMETER
TEMPERATURE = 4.2DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

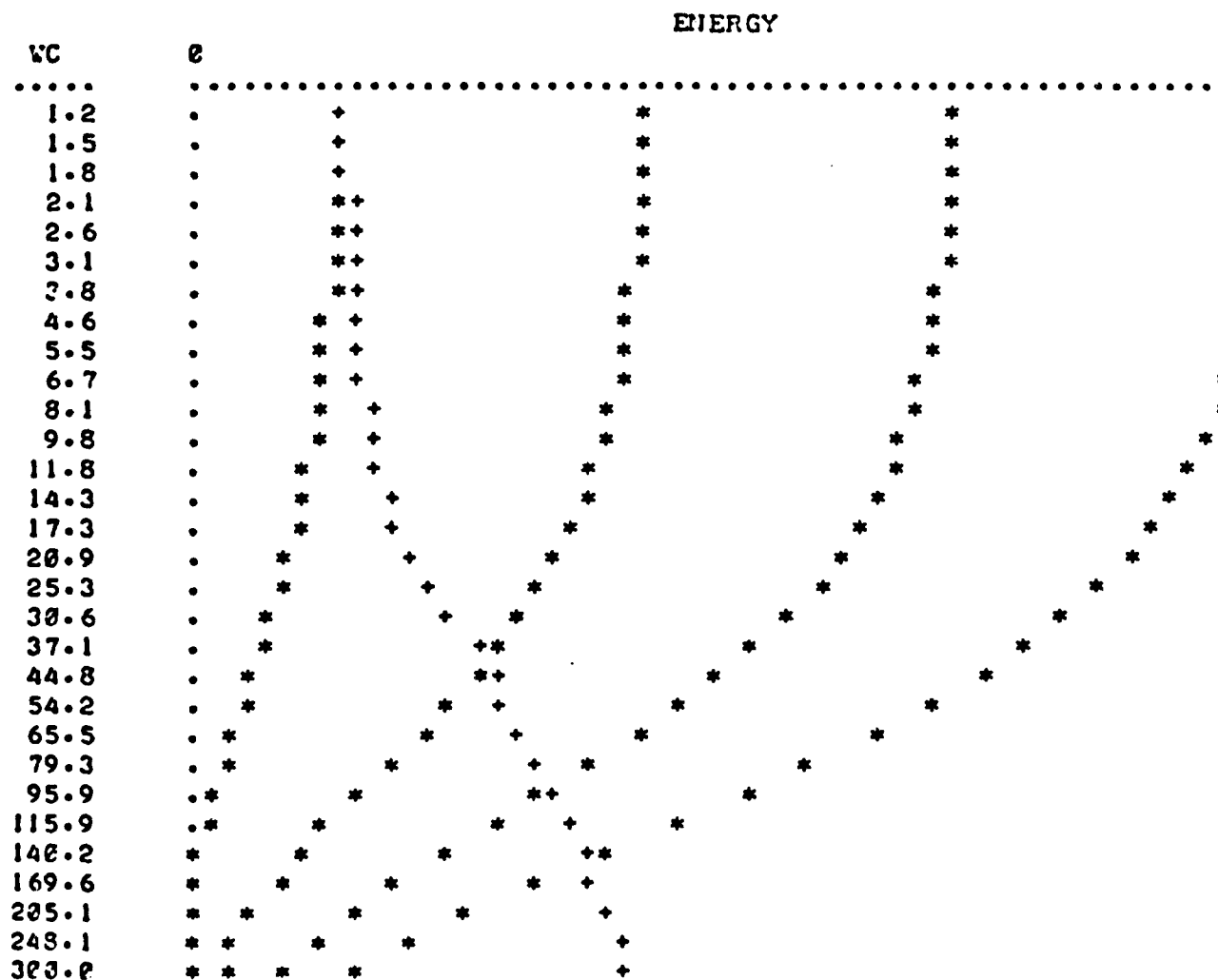


Figure 35

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	49.271	47.143	142.785	232.676	334.669	430.723
1.5	49.495	46.922	142.396	238.171	334.371	430.044
1.8	49.766	46.653	141.926	237.563	333.350	429.225
2.1	50.297	46.331	141.361	236.829	332.479	428.236
2.6	50.500	45.945	140.679	235.945	331.430	427.044
3.1	50.991	45.483	139.860	234.880	330.165	425.606
3.8	51.591	44.930	138.876	233.598	328.641	423.874
4.6	52.327	44.270	137.694	232.057	326.808	421.728
5.5	53.229	43.486	136.279	230.207	324.605	419.279
6.7	54.340	42.556	134.588	227.990	321.961	416.265
8.1	55.710	41.459	132.570	225.338	318.792	412.649
9.8	57.406	40.171	130.171	222.171	315.001	408.319
11.8	59.514	38.670	127.330	218.403	310.478	403.143
14.3	62.141	36.932	123.979	213.933	305.096	396.972
17.3	65.430	34.942	120.048	208.652	298.716	389.639
20.9	69.560	32.688	115.468	202.446	291.182	380.955
25.3	74.766	30.173	110.174	195.196	282.333	370.719
30.6	81.346	27.415	104.115	186.792	272.005	358.721
37.1	89.679	24.455	97.266	177.140	260.045	344.751
44.8	94.938	21.360	89.635	166.178	246.324	328.622
54.2	97.453	18.219	81.288	153.901	230.764	310.186
65.5	101.436	15.142	72.352	140.381	213.368	289.373
79.3	107.409	12.245	63.035	125.793	194.251	266.231
95.9	114.147	9.632	53.617	110.436	173.680	240.969
115.9	116.879	7.377	44.429	94.737	152.092	214.002
140.2	122.464	5.514	35.819	79.227	130.104	185.973
169.6	125.900	4.036	28.090	64.483	108.471	157.742
205.1	130.940	2.902	21.454	51.048	88.004	130.320
248.1	133.642	2.059	15.996	39.336	69.449	104.741
300.0	136.726	1.445	11.682	29.562	53.353	81.894

Table 35A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	526.818	622.942	719.091	815.258	911.441
1.5	526.067	622.126	718.213	814.323	910.452
1.8	525.160	621.140	717.153	813.194	909.258
2.1	524.066	619.949	715.873	811.831	907.816
2.6	522.746	618.512	714.328	810.185	906.075
3.1	521.153	616.779	712.465	808.199	903.975
3.8	519.234	614.689	710.217	805.804	901.440
4.6	516.922	612.171	707.508	802.917	898.385
5.5	514.140	609.140	704.246	799.439	894.704
6.7	510.796	605.494	700.322	795.253	890.272
8.1	506.781	601.114	695.604	790.221	884.941
9.8	501.967	595.860	689.942	784.177	878.538
11.8	496.208	589.568	683.157	776.930	870.856
14.3	489.332	582.048	675.040	768.256	861.656
17.3	481.146	573.084	665.356	757.897	850.661
20.9	471.433	562.431	653.832	745.559	837.555
25.3	459.955	549.818	640.169	730.912	821.980
30.6	446.459	534.954	624.036	713.592	803.540
37.1	430.688	517.534	605.087	693.212	781.809
44.8	412.394	497.258	582.971	669.371	756.341
54.2	391.366	473.852	557.357	641.685	726.697
65.5	367.465	447.110	527.971	609.816	692.480
79.3	340.665	416.935	494.646	573.528	653.385
95.9	311.110	383.400	457.385	532.752	609.273
115.9	279.171	346.819	416.436	487.667	560.251
140.2	245.482	307.799	372.366	438.789	506.778
169.6	210.962	267.281	326.113	387.038	449.742
205.1	176.765	226.517	278.996	333.773	390.521
248.1	144.162	186.973	232.633	280.730	330.945
300.0	114.359	150.137	188.761	229.866	273.155

Table 35B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N1	N2	N3	N4	N5
1.2	.68473E 11	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.5	.73134E 11	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.8	.88447E 11	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.1	.10697E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.6	.12937E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.1	.15646E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.8	.18922E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
4.6	.22884E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
5.5	.27676E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
6.7	.33472E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
8.1	.48481E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
9.8	.48957E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
11.8	.59209E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
14.3	.71608E 12	.00000E 0	.00000E 0	.00000E 0	.00000E 0
17.3	.86603E 12	.11144E 1	.00000E 0	.00000E 0	.00000E 0
20.9	.10474E 13	.11144E 1	.00000E 0	.00000E 0	.00000E 0
25.3	.12667E 13	.11144E 1	.00000E 0	.00000E 0	.00000E 0
30.6	.15319E 13	.11144E 1	.00000E 0	.00000E 0	.00000E 0
37.1	.18527E 13	.91740E 1	.00000E 0	.00000E 0	.00000E 0
44.8	.20901E 13	.15064E 12	.00000E 0	.00000E 0	.00000E 0
54.2	.22507E 13	.45919E 12	.11144E 1	.00000E 0	.00000E 0
65.5	.24512E 13	.82613E 12	.11144E 1	.00000E 0	.00000E 0
79.3	.27032E 13	.12605E 13	.11144E 1	.00000E 0	.00000E 0
95.9	.29688E 13	.17194E 13	.10541E 12	.11144E 1	.00000E 0
115.9	.31105E 13	.20580E 13	.62896E 12	.11144E 1	.00000E 0
140.2	.33220E 13	.24612E 13	.12232E 13	.79519E 1	.00000E 0
169.6	.34616E 13	.27784E 13	.17446E 13	.49528E 12	.11144E 1
205.1	.36370E 13	.31100E 13	.22694E 13	.12196E 13	.19325E 11
248.1	.37377E 13	.33418E 13	.26789E 13	.18235E 13	.82295E 12
300.0	.38428E 13	.35520E 13	.32441E 13	.23683E 13	.15575E 13

Table 35C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N6	N7	N8	N9	N10
1.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
4.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
5.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
6.7	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
8.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
9.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
11.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
14.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
17.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
20.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
25.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
30.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
37.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
44.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
54.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
65.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
79.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
95.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
115.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
140.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
169.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
205.1	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
248.1	.11144E 1	.11144E 1	.00000E 0	.00000E 0	.00000E 0
300.0	.63537E 12	.11144E 1	.11144E 1	.00000E 0	.00000E 0

Table 35D

STOP

1.00E+18 300.0 -25.0E-21 * . + 4.0880766

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER
TEMPERATURE = 300.0 DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

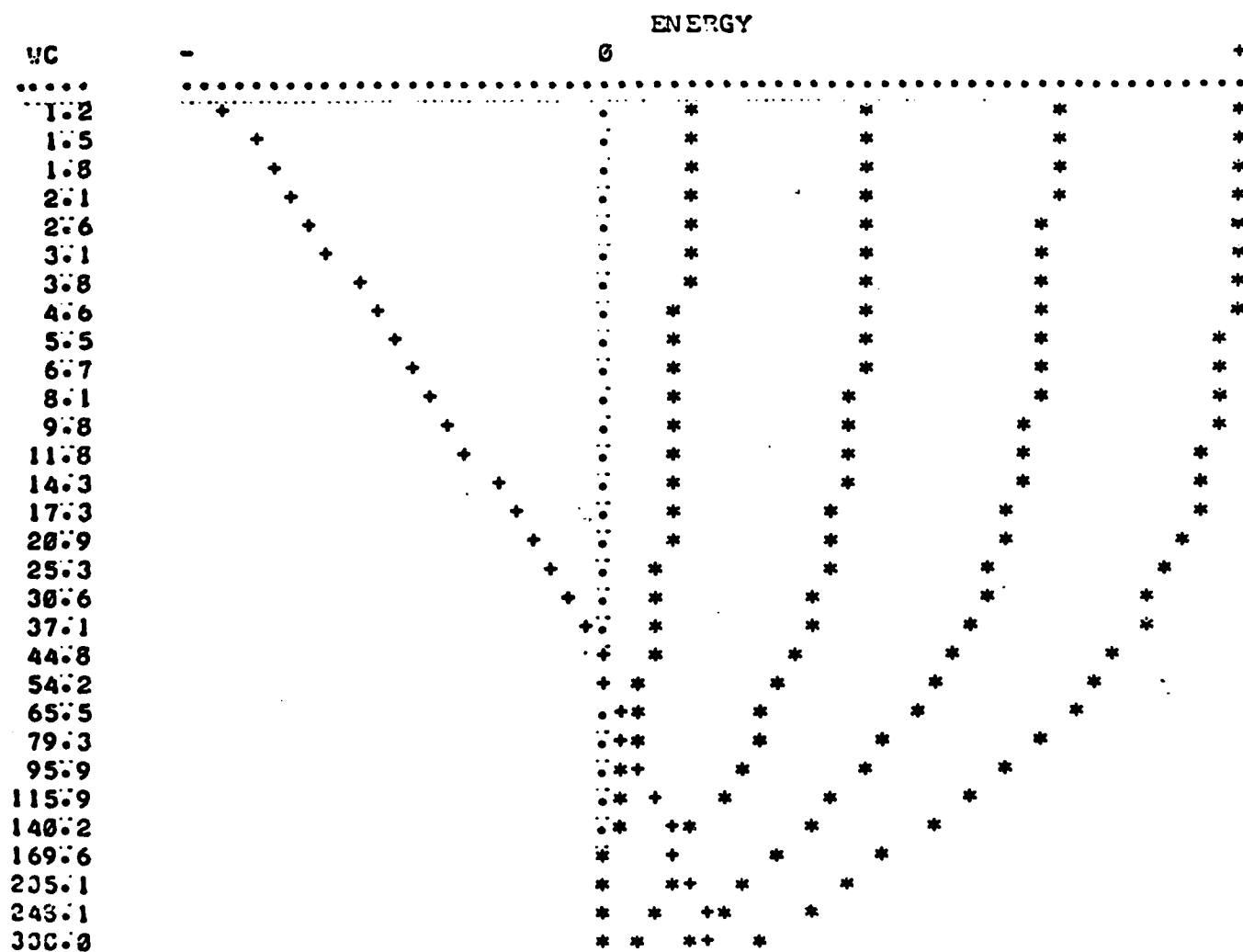


Figure 36

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-93.172	21.241	54.132	137.097	150.392	193.105
1.5	-85.304	21.174	54.015	136.945	149.913	192.923
1.8	-80.449	21.093	53.874	136.763	149.697	192.657
2.1	-75.625	20.996	53.753	136.542	149.435	192.360
2.6	-70.775	20.379	53.496	135.276	149.119	192.002
3.1	-65.932	20.738	53.250	135.955	148.738	191.569
3.8	-61.172	20.569	52.952	135.568	148.279	191.047
4.6	-56.401	20.367	52.593	135.101	147.725	190.418
5.5	-51.661	20.124	52.162	134.540	147.359	189.660
6.7	-46.954	19.835	51.645	133.866	146.256	188.747
8.1	-42.283	19.491	51.025	133.053	145.292	187.649
9.8	-37.667	19.034	50.284	132.085	144.134	186.329
11.8	-33.101	18.602	59.400	130.923	142.746	184.746
14.3	-28.596	18.037	58.349	99.536	141.086	182.849
17.3	-24.163	17.377	57.103	97.824	139.104	182.532
20.9	-19.810	16.613	55.632	95.924	136.745	177.877
25.3	-15.546	15.736	53.906	93.607	133.947	174.662
30.6	-11.381	14.742	51.893	90.882	130.641	170.854
37.1	-7.325	13.630	49.564	87.697	126.756	166.361
44.8	-3.385	12.409	46.895	84.001	122.213	161.092
54.2	.431	11.094	43.873	79.751	116.957	154.952
65.5	4.112	9.715	40.500	74.918	110.915	147.355
79.3	7.650	8.310	36.802	69.495	104.053	139.732
95.9	11.031	6.928	32.832	63.510	96.367	130.543
115.9	14.242	5.621	28.680	57.036	87.902	120.317
140.2	17.265	4.436	24.466	50.199	78.769	109.122
169.6	20.084	3.408	20.337	43.185	69.155	97.130
205.1	22.685	2.554	16.443	36.225	59.326	84.340
248.1	25.062	1.873	12.940	29.579	49.615	72.003
300.0	27.215	1.350	9.913	23.491	40.383	59.673

Table 36A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	236.132	279.167	322.209	365.257	408.309
1.5	235.907	278.922	321.946	364.976	408.013
1.8	235.635	278.626	321.628	364.638	407.655
2.1	235.307	278.269	321.244	364.229	407.222
2.6	234.910	277.838	320.780	363.735	406.700
3.1	234.431	277.317	320.220	363.139	406.069
3.8	233.853	276.688	319.545	362.419	405.307
4.6	233.157	275.930	318.729	361.550	404.388
5.5	232.317	275.015	317.746	360.502	403.279
6.7	231.305	273.913	316.560	359.238	401.942
8.1	230.087	272.586	315.132	357.716	400.331
9.8	228.623	270.991	313.414	355.884	398.391
11.8	226.865	269.073	311.349	353.681	396.058
14.3	224.757	266.772	308.870	351.035	393.254
17.3	222.234	264.016	305.898	347.861	389.891
20.9	219.222	260.722	302.343	344.062	385.861
25.3	215.634	256.794	298.099	339.523	381.045
30.6	211.375	252.123	293.048	334.116	375.301
37.1	206.339	246.591	287.056	327.693	368.473
44.8	200.415	240.068	279.978	320.096	360.385
54.2	193.486	232.417	271.659	311.150	350.648
65.5	185.441	223.504	261.940	300.677	339.663
79.3	176.183	213.206	250.674	288.504	326.632
95.9	165.645	201.423	237.734	274.475	311.576
115.9	153.809	183.107	223.037	258.480	294.351
140.2	140.729	173.279	206.575	240.476	274.884
169.6	126.557	157.067	188.443	220.529	253.209
205.1	111.563	139.725	168.078	198.050	229.510
248.1	96.143	121.656	148.280	175.828	204.161
300.0	80.804	103.406	127.218	152.049	177.751

Table 36B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.97847E 10	.18711E 12	.35523E 9	.67364E 8	.12741E 8
1.5	.11826E 11	.22634E 10	.43132E 9	.61812E 8	.13592E 8
1.8	.14291E 11	.27514E 10	.52414E 9	.99553E 8	.18835E 8
2.1	.17267E 11	.33392E 10	.63750E 9	.12136E 9	.23041E 8
2.4	.20859E 11	.40555E 10	.77646E 9	.14802E 9	.28164E 8
3.1	.25191E 11	.49296E 10	.94709E 9	.18096E 9	.34502E 8
3.8	.30414E 11	.59988E 10	.11570E 10	.22173E 9	.42379E 8
4.6	.36786E 11	.73087E 10	.14165E 10	.27243E 9	.52223E 8
5.5	.44283E 11	.89186E 10	.17387E 10	.33582E 9	.64664E 8
6.7	.53337E 11	.10931E 11	.21406E 10	.41550E 9	.80295E 8
8.1	.64322E 11	.13353E 11	.26450E 10	.51673E 9	.10036E 9
9.8	.77432E 11	.16393E 11	.32824E 10	.64614E 9	.12629E 9
11.8	.93116E 11	.20195E 11	.40947E 10	.81343E 9	.16222E 9
14.3	.11183E 12	.24958E 11	.51395E 10	.10325E 10	.20525E 9
17.3	.13409E 12	.30964E 11	.64981E 10	.13231E 10	.26600E 9
20.9	.16045E 12	.38589E 11	.82862E 10	.17151E 10	.34950E 9
25.3	.19150E 12	.48329E 11	.10672E 11	.22533E 10	.46676E 9
30.6	.22783E 12	.60853E 11	.13901E 11	.30069E 10	.63539E 9
37.1	.26995E 12	.77642E 11	.18342E 11	.40857E 10	.88437E 9
44.8	.31827E 12	.98652E 11	.24543E 11	.56661E 10	.12627E 10
54.2	.37269E 12	.12534E 12	.33331E 11	.80372E 10	.18553E 10
65.5	.43355E 12	.16064E 12	.45938E 11	.11666E 11	.25137E 10
79.3	.49950E 12	.20584E 12	.64166E 11	.17396E 11	.44132E 10
95.9	.56941E 12	.26264E 12	.90526E 11	.26533E 11	.71631E 10
115.9	.64143E 12	.33204E 12	.12826E 12	.41266E 11	.12011E 11
140.2	.71342E 12	.41366E 12	.18693E 12	.64966E 11	.26690E 11
169.6	.78324E 12	.50525E 12	.25173E 12	.10243E 12	.36312E 11
205.1	.84908E 12	.60274E 12	.34143E 12	.16923E 12	.60903E 11
248.1	.90970E 12	.70099E 12	.44748E 12	.23999E 12	.11050E 12
300.0	.96450E 12	.79495E 12	.56361E 12	.34537E 12	.18396E 12

Table 36C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6	N7	N8	N9	N10
1.2	.24107E 7	.45603E 6	.86296E 5	.16380E 5	.31561E 4
1.5	.29356E 7	.55573E 6	.10523E 6	.19968E 5	.38392E 4
1.8	.35799E 7	.67831E 6	.12852E 6	.24394E 5	.46851E 4
2.1	.43731E 7	.82952E 6	.15732E 6	.29882E 5	.57180E 4
2.4	.53532E 7	.10168E 7	.19306E 6	.36698E 5	.70231E 4
3.1	.65697E 7	.12499E 7	.23766E 6	.45222E 5	.86557E 4
3.8	.80871E 7	.15416E 7	.29366E 6	.55959E 5	.10707E 5
4.6	.99917E 7	.19092E 7	.36447E 6	.69577E 5	.13326E 5
5.5	.12400E 8	.23761E 7	.45481E 6	.87022E 5	.16690E 5
6.7	.15471E 8	.29749E 7	.57126E 6	.10961E 6	.21059E 5
8.1	.19427E 8	.37514E 7	.72316E 6	.13925E 6	.26839E 5
9.8	.24584E 8	.47716E 7	.92415E 6	.17873E 6	.34560E 5
11.8	.31400E 8	.61323E 7	.11945E 7	.23223E 6	.45115E 5
14.3	.40555E 8	.79797E 7	.15651E 7	.30622E 6	.59837E 5
17.3	.53082E 8	.10539E 8	.20844E 7	.41101E 6	.80891E 5
20.9	.70588E 8	.14169E 8	.28306E 7	.56342E 6	.11185E 6
25.3	.95647E 8	.19453E 8	.39341E 7	.79203E 6	.15893E 6
30.6	.13250E 9	.27382E 8	.56197E 7	.11471E 7	.23311E 6
37.1	.18837E 9	.39683E 8	.82905E 7	.17206E 7	.35518E 6
44.8	.27590E 9	.59489E 8	.12698E 8	.26889E 7	.56565E 6
54.2	.41809E 9	.92707E 8	.20308E 8	.44058E 7	.94824E 6
65.5	.65806E 9	.15092E 9	.34108E 8	.76188E 7	.16855E 7
79.3	.10794E 10	.25777E 9	.60482E 8	.13993E 8	.32000E 7
95.9	.18487E 10	.46346E 9	.11374E 9	.27446E 8	.65314E 7
115.9	.33060E 10	.87828E 9	.22741E 9	.57767E 8	.14402E 8
140.2	.61526E 10	.17513E 10	.48327E 9	.13019E 9	.34385E 8
169.6	.11829E 11	.36528E 10	.10867E 10	.31413E 9	.82711E 8
205.1	.23188E 11	.78801E 10	.25596E 10	.80355E 9	.24543E 9
248.1	.45465E 11	.17272E 11	.62114E 10	.21450E 10	.71733E 9
300.0	.86933E 11	.37513E 11	.15159E 11	.58364E 10	.21642E 10

Table 36D

1.30E+18 77.3 - 5.0E-21 * . + 2.4815530

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER
TEMPERATURE = 77.3DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

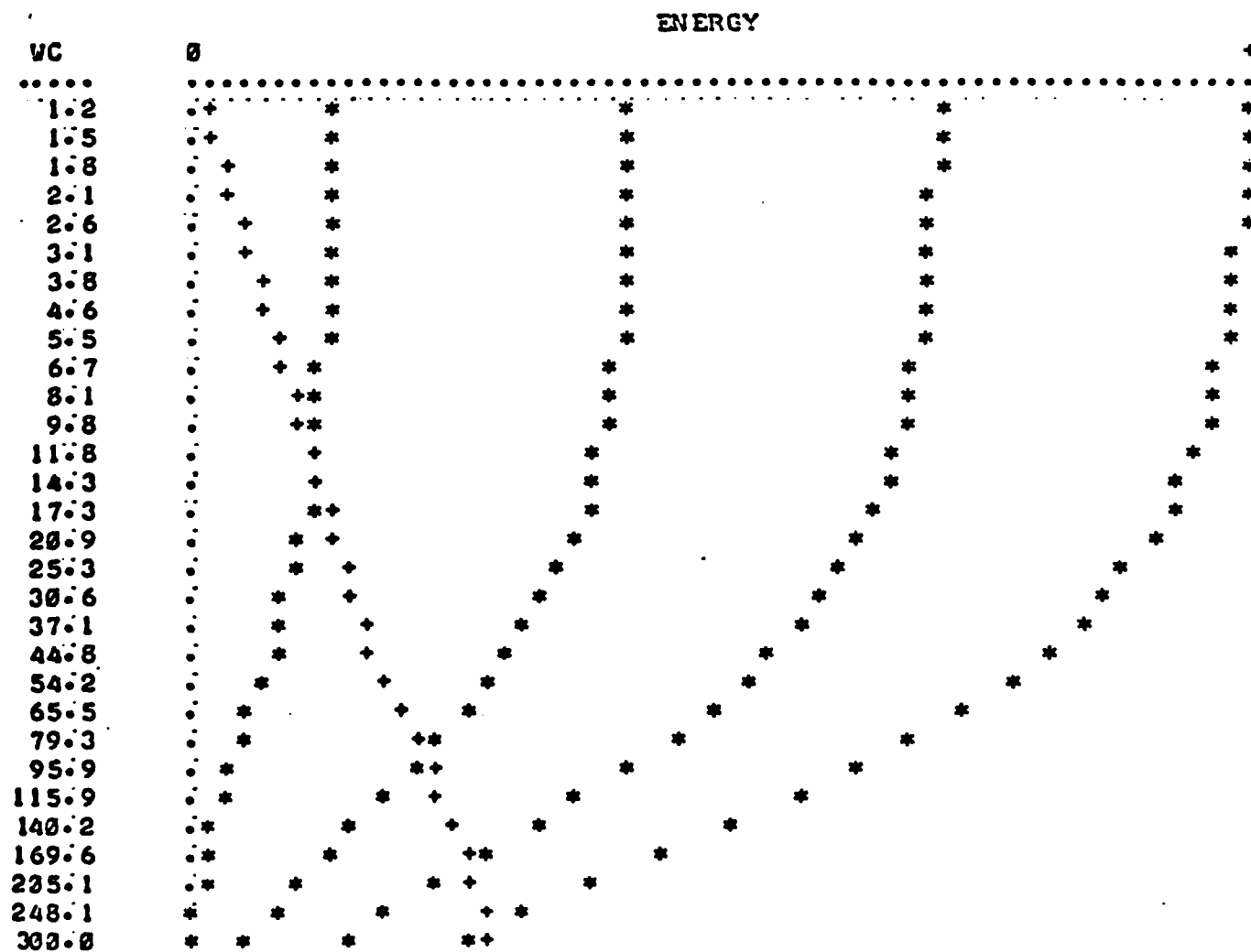


Figure 37

$w_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	3.231	21.241	64.132	187.397	153.892	193.186
1.3	4.472	21.174	64.615	186.945	149.913	192.903
1.5	5.784	21.393	63.874	186.763	149.697	192.657
2.1	6.934	20.996	63.783	186.542	149.435	192.353
2.6	8.158	20.879	63.498	186.276	149.119	192.322
3.1	9.375	20.738	63.258	185.955	148.738	191.569
3.8	10.586	20.569	62.952	185.558	148.279	191.047
4.6	11.788	20.367	62.593	185.101	147.725	190.418
5.5	12.962	20.124	62.162	184.548	147.059	189.668
6.7	14.167	19.835	61.645	183.866	146.256	188.747
8.1	15.345	19.491	61.025	183.056	145.292	187.649
9.8	16.518	19.084	60.284	182.085	144.134	186.329
11.8	17.689	18.602	59.438	180.923	142.746	184.746
14.3	18.865	18.037	58.349	99.536	141.036	182.849
17.3	20.058	17.377	57.183	97.834	139.184	180.582
20.9	21.285	16.613	55.632	95.924	136.745	177.877
25.3	22.572	15.736	53.936	93.537	133.947	174.662
30.6	23.953	14.742	51.893	90.882	132.641	170.854
37.1	25.473	13.630	49.564	87.697	126.756	156.361
44.8	27.173	12.489	46.895	84.031	122.218	161.392
54.2	29.068	11.094	43.873	79.751	116.957	154.952
65.5	31.085	9.715	40.568	74.918	110.915	147.855
79.3	33.053	8.318	36.832	69.495	104.253	139.732
95.9	34.825	6.928	32.832	63.518	95.367	132.546
115.9	36.492	5.621	28.688	57.036	87.982	123.317
140.2	38.289	4.436	24.466	50.199	78.769	109.122
169.6	39.919	3.408	20.337	43.185	69.155	97.136
205.1	41.444	2.554	16.448	36.225	59.326	84.543
248.1	42.886	1.873	12.943	29.579	49.615	72.223
300.0	44.284	1.358	9.913	23.491	40.383	59.673

Table 37A

ENERGY IN MILLI-ELECTRON VOLTS
VC IN ANGSTROMS

VC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	236.132	279.167	322.209	365.257	408.389
1.3	235.987	278.922	321.946	364.976	408.013
1.5	235.635	278.626	321.628	364.638	407.655
2.1	235.327	278.269	321.244	364.229	407.222
2.6	234.918	277.838	320.788	363.735	406.788
3.1	234.431	277.317	320.228	363.139	406.069
3.8	233.853	276.688	319.545	362.419	405.387
4.6	233.157	275.938	318.729	361.558	404.388
5.5	232.317	275.015	317.746	360.582	403.279
6.7	231.385	273.913	316.568	359.238	401.942
8.1	230.087	272.586	315.132	357.716	400.331
9.8	228.623	270.991	313.414	355.884	398.391
11.8	226.865	269.073	311.349	353.681	396.058
14.3	224.757	266.772	308.878	351.035	393.254
17.3	222.234	264.016	305.898	347.861	389.891
20.9	219.222	260.722	302.343	344.062	385.861
25.3	215.634	256.794	298.099	339.523	381.045
30.6	211.375	252.123	293.048	334.116	375.381
37.1	206.339	246.591	287.056	327.693	368.473
44.8	200.415	240.068	279.978	320.096	360.385
54.2	193.486	232.417	271.659	311.152	353.848
65.5	185.441	223.584	261.940	300.677	339.663
79.3	176.183	213.286	250.674	288.534	326.632
95.9	165.645	201.423	237.734	274.475	311.576
115.9	153.829	188.137	223.037	258.488	294.351
140.2	140.729	173.279	205.575	240.476	274.834
169.6	126.557	157.067	188.443	220.529	253.209
205.1	111.563	139.725	168.878	198.853	229.513
248.1	96.143	121.656	148.288	175.926	204.161
300.0	80.824	103.486	127.218	152.049	177.751

Table 37B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N1	N2	N3	N4	N5
1.2	.12075E 11	.19390E 8	.29837E 5	.67456E 2	.20430E 2
1.5	.14603E 11	.23787E 8	.36790E 5	.77444E 2	.23432E 2
1.8	.17660E 11	.29273E 8	.45553E 5	.91697E 2	.26430E 2
2.1	.21357E 11	.36148E 8	.56676E 5	.10785E 3	.23430E 2
2.6	.25829E 11	.44840E 8	.70950E 5	.13333E 3	.23430E 2
3.1	.31235E 11	.55922E 8	.89469E 5	.16249E 3	.20430E 2
3.8	.37774E 11	.70198E 8	.11382E 6	.23145E 3	.23430E 2
4.6	.45679E 11	.88823E 8	.14637E 6	.25561E 3	.23430E 2
5.5	.55239E 11	.11347E 9	.19373E 6	.33258E 3	.23430E 2
6.7	.65796E 11	.14667E 9	.25242E 6	.44233E 3	.23430E 2
8.1	.83769E 11	.19230E 9	.34263E 6	.60387E 3	.23430E 2
9.8	.97656E 11	.25656E 9	.47055E 6	.85093E 3	.22506E 2
11.8	.11837E 12	.34965E 9	.66886E 6	.12429E 4	.23006E 2
14.3	.14273E 12	.48933E 9	.96442E 6	.16929E 4	.22806E 2
17.3	.17259E 12	.70598E 9	.15116E 7	.32445E 4	.25656E 2
20.9	.22841E 12	.10593E 10	.24442E 7	.52134E 4	.31356E 2
25.3	.25167E 12	.16657E 10	.42080E 7	.96332E 4	.42285E 2
30.6	.30361E 12	.27706E 10	.78146E 7	.19526E 5	.57466E 2
37.1	.36561E 12	.49212E 10	.15883E 8	.44831E 5	.13303E 3
44.8	.43871E 12	.93962E 10	.35833E 8	.11275E 6	.34113E 3
54.2	.52269E 12	.19205E 11	.90470E 8	.33157E 6	.13975E 4
65.5	.61441E 12	.40813E 11	.25433E 9	.11173E 7	.42813E 4
79.3	.70721E 12	.84746E 11	.77265E 9	.42286E 7	.19520E 5
95.9	.79522E 12	.16102E 12	.24781E 10	.17605E 8	.13179E 6
115.9	.87864E 12	.27245E 12	.83225E 10	.81355E 8	.51170E 6
140.2	.96051E 12	.41274E 12	.26619E 11	.41554E 9	.42361E 7
169.6	.10379E 13	.56535E 12	.59870E 11	.22216E 10	.33781E 8
205.1	.11052E 13	.71431E 12	.21894E 12	.12303E 11	.27959E 9
248.1	.11654E 13	.85269E 12	.40183E 12	.56333E 11	.23233E 10
300.0	.12176E 13	.97513E 12	.59647E 12	.19257E 12	.17457E 11

Table 37C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N6	N7	N8	N9	N10
1.2	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
1.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.22430E 2
1.8	.20430E 2	.20430E 2	.20430E 2	.23430E 2	.23430E 2
2.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.23430E 2
2.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.22430E 2
3.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
3.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.23430E 2
4.6	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
5.5	.20430E 2	.23430E 2	.20430E 2	.20430E 2	.20430E 2
6.7	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.23430E 2
8.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
9.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.23430E 2
11.8	.23430E 2	.23430E 2	.20430E 2	.23430E 2	.23430E 2
14.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.23430E 2
17.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
20.9	.20430E 2	.20430E 2	.20430E 2	.23430E 2	.23430E 2
25.3	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
30.6	.20430E 2	.20430E 2	.20430E 2	.23430E 2	.23430E 2
37.1	.23430E 2	.20430E 2	.20430E 2	.23430E 2	.23430E 2
44.8	.20430E 2	.20430E 2	.20430E 2	.23430E 2	.23430E 2
54.2	.22836E 2	.23430E 2	.20430E 2	.20430E 2	.23430E 2
65.5	.34200E 2	.23430E 2	.20430E 2	.20430E 2	.23430E 2
79.3	.99774E 2	.23430E 2	.20430E 2	.20430E 2	.20430E 2
95.9	.53355E 3	.22806E 2	.20430E 2	.20430E 2	.20430E 2
115.9	.39439E 4	.42285E 2	.20430E 2	.23430E 2	.23430E 2
140.2	.36546E 5	.28397E 3	.22606E 2	.20430E 2	.20430E 2
169.6	.40344E 6	.40456E 4	.56064E 2	.20430E 2	.20430E 2
205.1	.48312E 7	.69228E 5	.87326E 3	.20232E 2	.20430E 2
248.1	.61303E 8	.13112E 7	.23704E 5	.39387E 3	.25656E 2
300.0	.75475E 9	.25348E 8	.69140E 6	.16386E 5	.36061E 3

Table 37D

STOP

1.00E+18 4.2 1.0E-21 * . + 2.4816500

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 19/CUBIC CENTIMETER

TEMPERATURE = 4.2DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

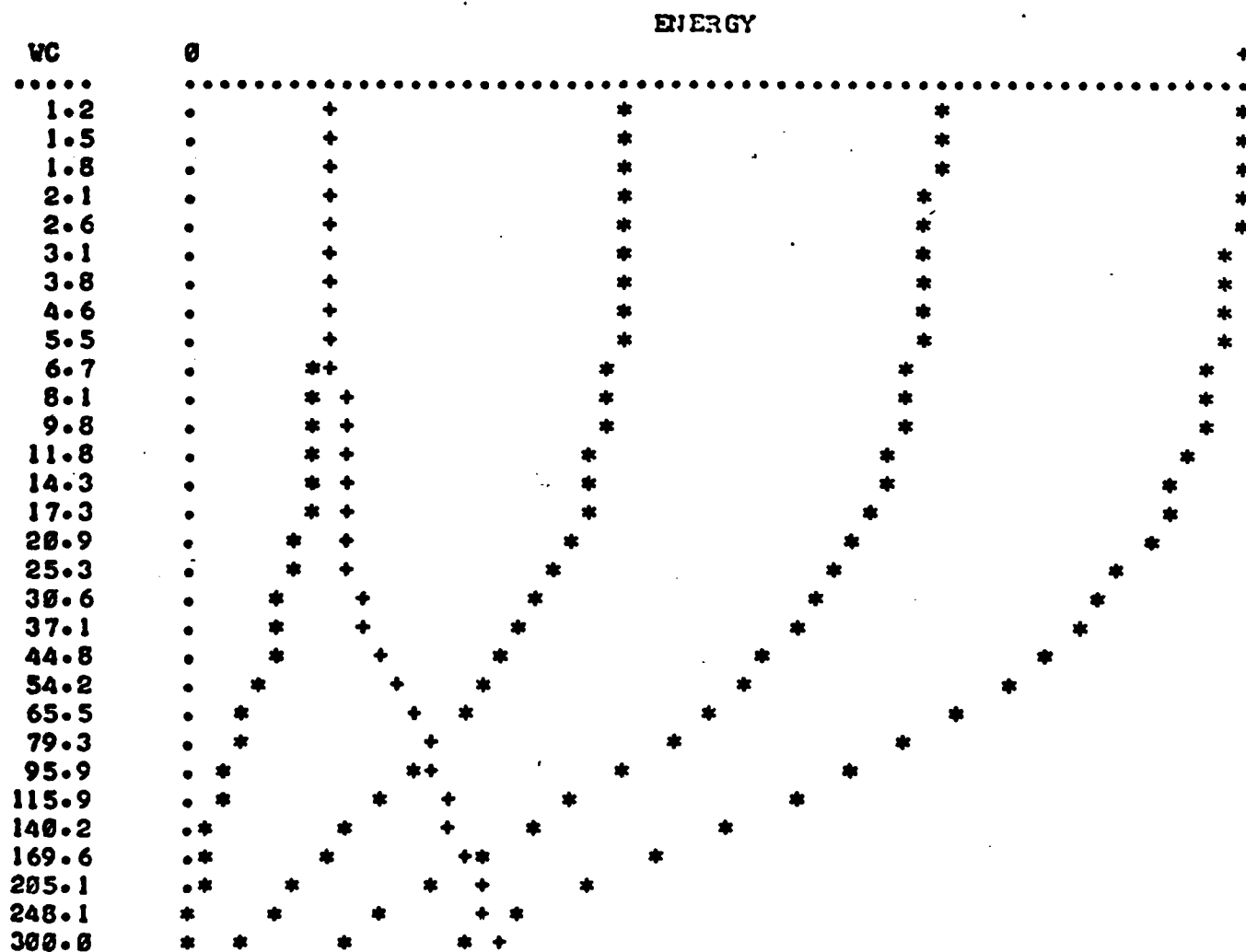


Figure 38

$W_c (\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	21.534	21.241	64.132	107.097	153.092	193.126
1.5	21.509	21.174	64.015	106.945	149.913	192.903
1.8	21.645	21.093	63.874	106.763	149.697	192.657
2.1	21.701	20.996	63.703	106.542	149.435	192.360
2.6	21.759	20.879	63.493	106.276	149.119	192.002
3.1	21.822	20.738	63.250	105.955	148.738	191.569
3.8	21.892	20.569	62.952	105.568	148.279	191.047
4.6	21.974	20.367	62.593	105.101	147.725	190.418
5.5	22.071	20.124	62.162	104.540	147.059	189.660
6.7	22.192	19.835	61.645	103.866	146.256	188.747
8.1	22.342	19.491	61.025	103.056	145.292	187.649
9.8	22.531	19.084	60.284	102.085	144.134	186.329
11.8	22.771	18.602	59.400	100.923	142.746	184.746
14.3	23.079	18.037	58.349	99.536	141.086	182.849
17.3	23.475	17.377	57.103	97.884	139.104	180.582
20.9	23.987	16.613	55.632	95.924	136.745	177.877
25.3	24.655	15.736	53.906	93.607	133.947	174.662
30.6	25.528	14.742	51.893	90.882	130.641	170.854
37.1	26.675	13.630	49.564	87.697	126.756	166.361
44.8	28.185	12.409	46.895	84.001	122.218	161.092
54.2	30.174	11.094	43.873	79.751	116.957	154.952
65.5	32.791	9.715	40.500	74.918	110.915	147.855
79.3	36.161	8.310	36.802	69.495	104.053	139.732
95.9	36.756	6.928	32.832	63.510	96.367	130.548
115.9	37.560	5.621	28.680	57.036	87.902	120.317
140.2	39.134	4.436	24.466	50.199	78.769	109.122
169.6	41.721	3.408	20.337	43.185	69.155	97.138
205.1	42.478	2.554	16.448	36.225	59.326	84.640
248.1	43.906	1.873	12.940	29.579	49.615	72.003
300.0	45.187	1.350	9.913	23.491	40.383	59.673

Table 38A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	236.132	279.167	322.209	365.257	408.309
1.5	235.907	278.922	321.946	364.976	408.013
1.8	235.635	278.626	321.628	364.638	407.655
2.1	235.307	278.269	321.244	364.229	407.222
2.6	234.910	277.838	320.780	363.735	406.700
3.1	234.431	277.317	320.220	363.139	406.069
3.8	233.853	276.688	319.545	362.419	405.307
4.6	233.157	275.930	318.729	361.550	404.388
5.5	232.317	275.015	317.746	360.502	403.279
6.7	231.305	273.913	316.560	359.238	401.942
8.1	230.087	272.586	315.132	357.716	400.331
9.8	228.623	270.991	313.414	355.884	398.391
11.8	226.865	269.073	311.349	353.681	396.058
14.3	224.757	266.772	308.870	351.035	393.254
17.3	222.234	264.016	305.898	347.861	389.891
20.9	219.222	260.722	302.343	344.062	385.861
25.3	215.634	256.794	298.099	339.523	381.045
30.6	211.375	252.123	293.048	334.116	375.301
37.1	206.339	246.591	287.056	327.693	368.473
44.8	200.415	240.068	279.978	320.096	360.385
54.2	193.486	232.417	271.659	311.150	350.848
65.5	185.441	223.504	261.940	300.677	339.663
79.3	176.183	213.206	250.674	288.504	326.632
95.9	165.645	201.423	237.734	274.475	311.576
115.9	153.809	188.107	223.037	258.480	294.351
140.2	140.729	173.279	206.575	240.476	274.884
169.6	126.557	157.067	188.443	220.529	253.209
205.1	111.563	139.725	168.878	198.650	229.510
248.1	96.143	121.656	148.280	175.028	204.161
300.0	80.804	103.406	127.218	152.049	177.751

Table 38B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
1.2	.12893E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
1.5	.14627E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
1.8	.17690E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
2.1	.21395E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
2.6	.25874E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
3.1	.31292E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
3.8	.37844E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
4.6	.45769E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
5.5	.55354E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
6.7	.66944E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
8.1	.80961E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
9.8	.97915E 11	.11144E 1	.00000E 0	.00000E 0	.00000E 0
11.8	.11842E 12	.11144E 1	.00000E 0	.00000E 0	.00000E 0
14.3	.14322E 12	.11144E 1	.00000E 0	.00000E 0	.00000E 0
17.3	.17321E 12	.11144E 1	.00000E 0	.00000E 0	.00000E 0
20.9	.20948E 12	.11144E 1	.00000E 0	.00000E 0	.00000E 0
25.3	.25334E 12	.11144E 1	.00000E 0	.00000E 0	.00000E 0
30.6	.30639E 12	.11144E 1	.00000E 0	.00000E 0	.00000E 0
37.1	.37055E 12	.11144E 1	.11144E 1	.00000E 0	.00000E 0
44.8	.44614E 12	.11144E 1	.11144E 1	.00000E 0	.00000E 0
54.2	.54198E 12	.11144E 1	.11144E 1	.00000E 0	.00000E 0
65.5	.65548E 12	.67898E 1	.11144E 1	.00000E 0	.00000E 0
79.3	.79112E 12	.16145E 10	.11144E 1	.00000E 0	.00000E 0
95.9	.84728E 12	.11146E 12	.11144E 1	.11144E 1	.00000E 0
115.9	.90725E 12	.25224E 12	.11144E 1	.11144E 1	.00000E 0
140.2	.93563E 12	.41666E 12	.11144E 1	.11144E 1	.00000E 0
169.6	.10883E 13	.60744E 12	.17322E 9	.11144E 1	.11144E 1
205.1	.11341E 13	.73939E 12	.17761E 12	.11144E 1	.11144E 1
248.1	.11940E 13	.87961E 12	.40699E 12	.14452E 4	.11144E 1
300.0	.12452E 13	.10020E 13	.61629E 12	.13648E 12	.11144E 1

Table 38C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6	N7	N8	N9	N10
1.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
4.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
5.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
6.7	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
8.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
9.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
11.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
14.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
17.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
20.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
25.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
30.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
37.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
44.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
54.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
65.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
79.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
95.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
115.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
140.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
169.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
205.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
248.1	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
300.0	.11144E 1	.11144E 1	.00000E 0	.00000E 0	.00000E 0

Table 38D

GRAPH OF ENERGY LEVELS VS. WC

AUG 10 19

NGAAS K1 = K2 = K3 = 0.068 EL = 10.9

DONOR CONCENTRATION = .5E 18/CUBIC CENTIMETER
TEMPERATURE = 300.0 DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

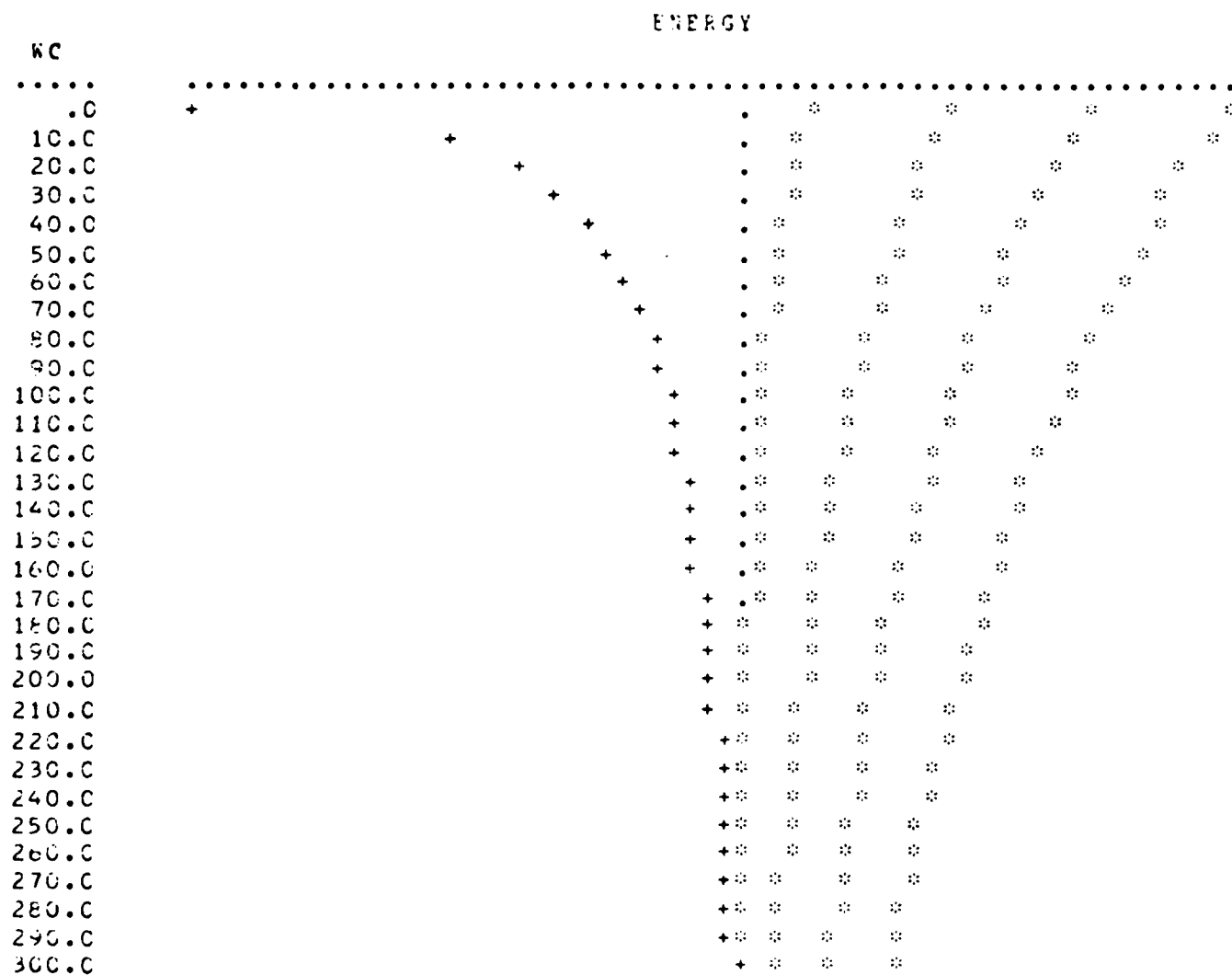


Figure 39

$n_c(\lambda)$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
.C	-123.331	15.069	45.469	75.665	106.316	136.756
10.C	-65.207	13.729	43.054	72.744	102.585	132.515
20.C	-48.727	12.364	40.524	69.409	98.595	127.958
30.C	-39.587	11.142	38.146	66.230	94.762	123.560
40.C	-33.406	10.048	35.914	63.201	91.083	119.317
50.C	-28.817	9.072	33.820	60.317	87.552	115.225
60.C	-25.216	8.202	31.857	57.572	84.165	111.279
70.C	-22.284	7.426	30.017	54.960	80.916	107.475
80.C	-19.831	6.734	28.294	52.476	77.800	103.808
90.C	-17.738	6.119	26.660	50.113	74.814	100.275
100.C	-15.923	5.570	25.170	47.868	71.952	96.872
110.C	-14.331	5.080	23.757	45.734	69.209	93.593
120.C	-12.918	4.644	22.435	43.707	66.582	90.436
130.C	-11.654	4.253	21.199	41.781	64.066	87.395
140.C	-10.515	3.904	20.042	39.952	61.656	84.468
150.C	-9.482	3.591	18.960	38.214	59.348	81.650
160.C	-8.540	3.310	17.947	36.564	57.139	78.937
170.C	-7.677	3.058	17.000	34.998	55.023	76.326
180.C	-6.882	2.830	16.113	33.510	52.998	73.814
190.C	-6.149	2.625	15.283	32.097	51.060	71.396
200.C	-5.468	2.439	14.506	30.755	49.204	69.069
210.C	-4.836	2.271	13.778	29.481	47.428	66.831
220.C	-4.245	2.118	13.095	28.270	45.728	64.676
230.C	-3.693	1.979	12.456	27.120	44.100	62.604
240.C	-3.175	1.852	11.855	26.028	42.542	60.609
250.C	-2.688	1.737	11.292	24.969	41.050	58.690
260.C	-2.230	1.631	10.763	24.003	39.621	56.844
270.C	-1.797	1.534	10.266	23.064	38.254	55.067
280.C	-1.387	1.445	9.799	22.172	36.944	53.357
290.C	-.998	1.363	9.360	21.323	35.689	51.711
300.C	-.629	1.289	8.946	20.516	34.487	50.128

Table 39A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
.C	167.202	197.653	228.107	258.564	289.023
10.C	162.505	192.539	222.608	252.704	282.823
20.C	157.441	187.013	216.654	246.350	276.091
30.C	152.537	181.648	210.861	240.157	269.522
40.C	147.790	176.440	205.226	234.123	263.111
50.C	143.195	171.385	199.746	228.244	256.857
60.C	138.748	166.481	194.417	222.518	250.755
70.C	134.446	161.722	189.236	216.940	244.804
80.C	130.284	157.107	184.199	211.509	238.999
90.C	126.259	152.630	179.303	206.220	233.339
100.C	122.367	148.289	174.545	201.070	227.820
110.C	118.604	144.080	169.921	196.057	222.439
120.C	114.966	140.000	165.429	191.178	217.193
130.C	111.449	136.045	161.065	186.429	212.079
140.C	108.051	132.212	156.825	181.807	207.095
150.C	104.767	128.497	152.708	177.310	202.238
160.C	101.594	124.897	148.709	172.934	197.504
170.C	98.529	121.410	144.825	168.676	192.892
180.C	95.568	118.031	141.054	164.534	188.397
190.C	92.707	114.757	137.392	160.505	184.018
200.C	89.944	111.586	133.837	156.586	179.752
210.C	87.276	108.515	130.386	152.774	175.597
220.C	84.698	105.540	127.035	149.067	171.548
230.C	82.209	102.659	123.783	145.461	167.605
240.C	79.805	99.868	120.626	141.954	163.764
250.C	77.484	97.166	117.561	138.544	160.023
260.C	75.242	94.549	114.586	135.226	156.380
270.C	73.076	92.014	111.699	132.003	152.831
280.C	70.985	89.559	108.897	128.868	149.375
290.C	68.966	87.182	106.177	125.819	146.010
300.C	67.015	84.886	103.537	122.854	142.732

Table 39B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N1	N2	N3	N4	N5
.0	.34557E 10	.10683E 10	.32943E 9	.10149E 9	.31253E 8
10.C	.33819E 11	.11044E 11	.35188E 10	.11108E 10	.34903E 9
20.C	.65980E 11	.22860E 11	.75543E 10	.24503E 10	.78752E 9
30.C	.96467E 11	.35391E 11	.12130E 11	.40435E 10	.13293E 10
40.C	.12528E 12	.48568E 11	.17263E 11	.59145E 10	.19888E 10
50.C	.15245E 12	.62308E 11	.22962E 11	.80859E 10	.27813E 10
60.C	.17800E 12	.76521E 11	.29228E 11	.10579E 11	.37222E 10
70.C	.20200E 12	.91114E 11	.36053E 11	.13411E 11	.48271E 10
80.C	.22450E 12	.10599E 12	.43422E 11	.16600E 11	.61114E 10
90.C	.24557E 12	.12106E 12	.51312E 11	.20156E 11	.75901E 10
100.C	.26528E 12	.13622E 12	.59694E 11	.24090E 11	.92777E 10
110.C	.28373E 12	.15140E 12	.68534E 11	.28405E 11	.11158E 11
120.C	.30099E 12	.16651E 12	.77792E 11	.33105E 11	.13332E 11
130.C	.31713E 12	.18149E 12	.87425E 11	.38186E 11	.15723E 11
140.C	.33224E 12	.19628E 12	.97390E 11	.43643E 11	.18369E 11
150.C	.34639E 12	.21082E 12	.10764E 12	.49467E 11	.21278E 11
160.C	.35965E 12	.22508E 12	.11812E 12	.55645E 11	.24457E 11
170.C	.37209E 12	.23902E 12	.12880E 12	.62163E 11	.27910E 11
180.C	.38377E 12	.25260E 12	.13963E 12	.69001E 11	.31639E 11
190.C	.39475E 12	.26581E 12	.15056E 12	.76141E 11	.35645E 11
200.C	.40508E 12	.27864E 12	.16156E 12	.83561E 11	.39926E 11
210.C	.41481E 12	.29107E 12	.17258E 12	.91237E 11	.44479E 11
220.C	.42400E 12	.30310E 12	.18360E 12	.99146E 11	.49298E 11
230.C	.43268E 12	.31473E 12	.19458E 12	.10726E 12	.54374E 11
240.C	.44089E 12	.32596E 12	.20548E 12	.11556E 12	.59707E 11
250.C	.44866E 12	.33680E 12	.21630E 12	.12402E 12	.65283E 11
260.C	.45604E 12	.34724E 12	.22700E 12	.13262E 12	.71088E 11
270.C	.46304E 12	.35731E 12	.23756E 12	.14132E 12	.77112E 11
280.C	.46971E 12	.36701E 12	.24796E 12	.15012E 12	.83343E 11
290.C	.47605E 12	.37636E 12	.25823E 12	.15897E 12	.89767E 11
300.C	.48211E 12	.38535E 12	.26830E 12	.16788E 12	.96369E 11

Table 39C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
WC IN ANGSTROMS

WC	N6		N7		N8		N9		N10	
.C	.96215E	7	.29616E	7	.91150F	6	.28055E	6	.86380E	5
10.C	.10938E	9	.34217E	8	.10689E	8	.33355E	7	.10400E	7
20.C	.25174E	9	.80174E	5	.25464E	8	.80702E	7	.25531E	7
30.C	.43341E	9	.14053E	9	.45381E	8	.14607E	9	.46690E	7
40.C	.66144E	9	.21835E	9	.71687E	8	.23433E	8	.76328E	7
50.C	.94351E	9	.31710E	9	.10584E	9	.35135E	8	.11612E	8
60.C	.12879E	10	.44065E	9	.14952E	9	.50406E	8	.16903E	8
70.C	.17035E	10	.59333E	9	.20466E	9	.70064E	8	.23837E	8
80.C	.21997E	10	.77988E	9	.27345E	9	.95057E	8	.32811E	8
90.C	.27862E	10	.10055E	10	.35335E	9	.12648E	9	.44290E	8
100.C	.34730E	10	.12756E	10	.46209E	9	.16560E	9	.58823E	8
110.C	.42705E	10	.15964E	10	.58771E	9	.21362E	9	.77045E	8
120.C	.51891E	10	.19739E	10	.73350E	9	.27275E	9	.99686E	8
130.C	.62389E	10	.24149E	10	.91808E	9	.34419E	9	.12759E	9
140.C	.74303E	10	.29263E	10	.11303E	10	.43012E	9	.16169E	9
150.C	.87731E	10	.35150E	10	.13794E	10	.53272E	9	.20308E	9
160.C	.10277E	11	.41384E	10	.16697E	10	.65438E	9	.25295E	9
170.C	.11950E	11	.49538E	10	.20059E	10	.79770E	9	.31264E	9
180.C	.13802E	11	.58186E	10	.23429E	10	.96548E	9	.38362E	9
190.C	.15840E	11	.67900E	10	.28357E	10	.11607E	10	.46751E	9
200.C	.18070E	11	.78754E	10	.33395E	10	.13866E	10	.56609E	9
210.C	.20498E	11	.90816E	10	.39098E	10	.16466E	10	.68128E	9
220.C	.23129E	11	.10416E	11	.45518E	10	.19441E	10	.81515E	9
230.C	.25967E	11	.11884E	11	.52712E	10	.22829E	10	.96993E	9
240.C	.29015E	11	.13492E	11	.60735E	10	.26669E	10	.11480E	10
250.C	.32274E	11	.15246E	11	.69639E	10	.31001E	10	.13518E	10
260.C	.35744E	11	.17150E	11	.79480E	10	.35864E	10	.15841E	10
270.C	.39425E	11	.19210E	11	.90310E	10	.41302E	10	.18477E	10
280.C	.43315E	11	.21430E	11	.10218E	11	.47355E	10	.21454E	10
290.C	.47411E	11	.23811E	11	.11514E	11	.54068E	10	.24802E	10
300.C	.51710E	11	.26350E	11	.12923E	11	.61481E	10	.28554E	10

Table 39D

5.00E+17 77.0 - 5.0E-21 * . + 1.9213561

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .5E 18/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

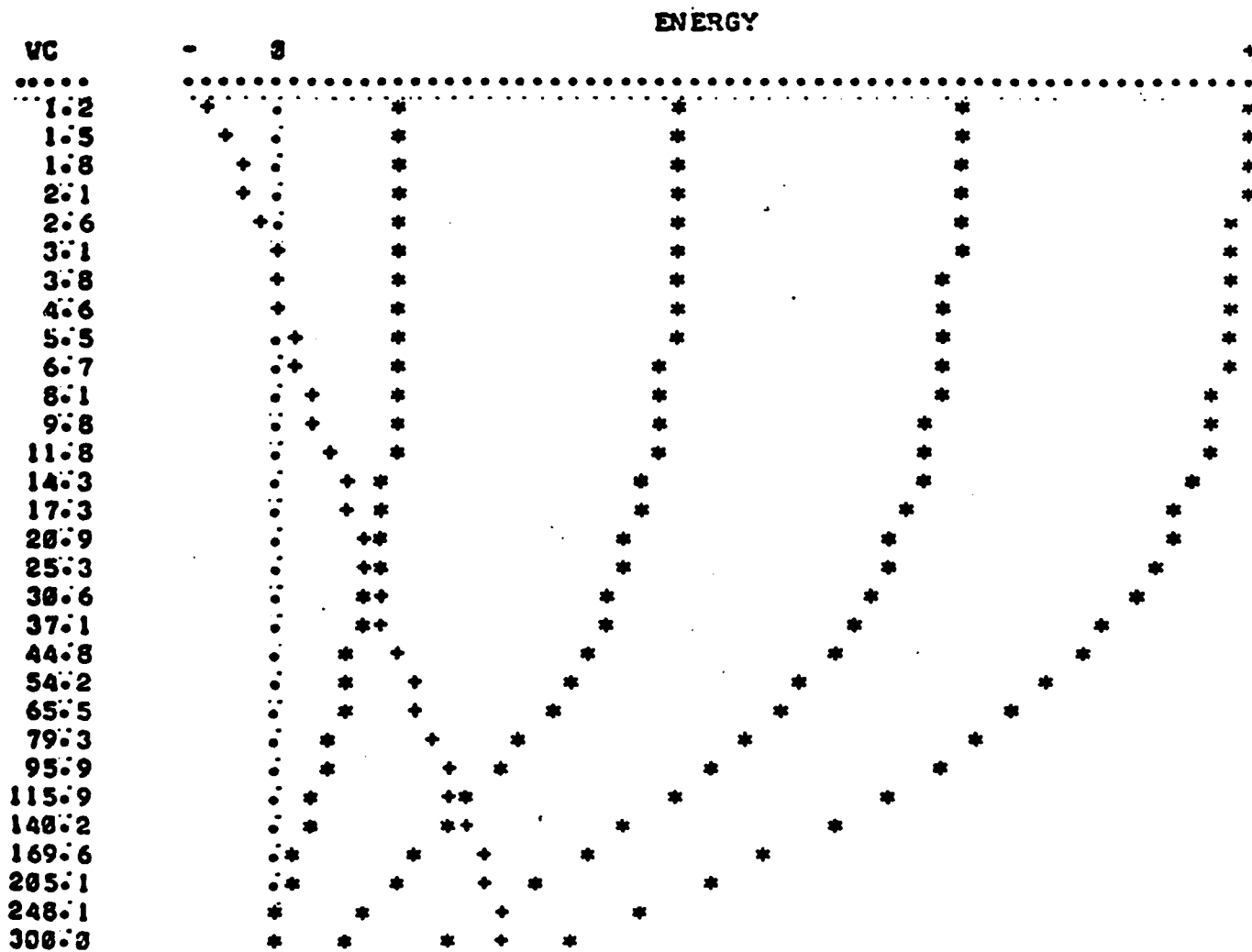


Figure 40

W (Å)	E _f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-7.719	15.056	45.411	75.810	126.223	136.656
1.5	-6.477	15.316	45.341	75.723	106.121	136.535
1.8	-5.238	14.968	45.257	75.611	125.992	136.389
2.1	-4.003	14.910	45.156	75.483	105.836	136.212
2.6	-2.773	14.840	45.233	75.321	105.648	135.998
3.1	-1.550	14.755	44.886	75.130	125.421	135.741
3.8	-.334	14.654	44.708	74.899	105.148	135.433
4.6	.874	14.533	44.493	74.621	104.817	135.355
5.5	2.072	14.387	44.235	74.286	104.419	134.622
6.7	3.260	14.213	43.926	73.882	103.940	134.257
8.1	4.435	14.236	43.554	73.398	103.363	133.401
9.8	5.597	13.759	43.109	72.816	102.670	132.612
11.8	6.745	13.466	42.576	72.112	101.838	131.663
14.3	7.879	13.121	41.942	71.283	100.841	133.526
17.3	9.003	12.715	41.187	70.257	99.648	129.163
23.9	10.118	12.243	40.292	69.101	98.225	127.534
25.3	11.215	11.695	39.237	67.694	96.531	125.592
30.6	12.322	11.368	38.000	66.032	94.523	123.284
37.1	13.444	10.358	36.557	64.078	92.151	120.551
44.8	14.595	9.565	34.890	61.795	89.365	117.322
54.2	15.789	8.694	32.981	59.148	86.113	113.551
65.5	17.033	7.760	30.821	56.107	82.346	109.151
79.3	18.315	6.782	28.415	52.652	78.022	104.273
95.9	19.630	5.789	25.781	48.781	73.113	98.231
115.9	20.844	4.815	22.960	44.516	67.633	91.730
140.2	22.030	3.896	20.016	39.911	61.682	84.402
169.6	23.176	3.067	17.037	35.050	55.100	76.431
205.1	24.276	2.351	14.128	30.096	48.258	67.915
248.1	25.300	1.758	11.399	25.187	41.335	59.058
300.0	26.241	1.283	8.946	22.516	34.487	53.128

Table 40A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	167.092	197.533	227.978	258.426	288.877
1.5	166.958	197.387	227.821	258.259	288.791
1.8	166.796	197.211	227.632	258.058	288.488
2.1	166.600	196.998	227.403	257.815	288.231
2.6	166.364	196.741	227.127	257.521	287.920
3.1	166.079	196.431	226.794	257.165	287.544
3.8	165.735	196.056	226.391	256.737	287.091
4.6	165.319	195.604	225.905	256.219	286.543
5.5	164.818	195.059	225.319	255.594	285.882
6.7	164.215	194.402	224.612	254.841	285.085
8.1	163.487	193.610	223.760	253.932	284.124
9.8	162.612	192.656	222.734	252.838	282.965
11.8	161.560	191.509	221.499	251.521	281.571
14.3	160.297	190.131	220.315	249.938	279.894
17.3	158.782	188.478	218.233	248.036	277.879
20.9	156.970	186.498	216.098	245.756	275.462
25.3	154.836	184.131	213.544	243.027	272.567
30.6	152.230	181.310	210.496	239.767	269.106
37.1	149.172	177.957	206.869	235.884	264.983
44.8	145.559	173.987	202.569	231.274	262.081
54.2	141.310	169.308	197.493	225.822	254.277
65.5	136.344	163.823	191.524	219.425	247.435
79.3	130.582	157.437	184.563	211.899	239.416
95.9	123.957	150.364	176.492	203.179	230.081
115.9	116.424	141.630	167.233	193.139	219.302
140.2	107.975	132.125	156.733	181.703	206.982
169.6	98.652	121.549	144.981	168.347	193.277
205.1	88.570	110.006	132.262	154.626	177.617
248.1	77.928	97.684	118.149	139.199	160.743
300.0	67.015	84.880	103.537	122.854	142.732

Table 40B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N1	N2	N3	N4	N5
1.2	.89838E 10	.62563E 8	.63974E 6	.65428E 4	.86471E 2
1.5	.72363E 12	.76249E 8	.78212E 6	.80152E 4	.12262E 3
1.8	.87506E 13	.93278E 8	.95534E 6	.98444E 4	.12163E 3
2.1	.10582E 11	.11384E 9	.11775E 7	.12136E 5	.14348E 3
2.6	.12795E 11	.13957E 9	.14516E 7	.15323E 5	.17389E 3
3.1	.15472E 11	.17161E 9	.17967E 7	.18689E 5	.21192E 3
3.8	.18708E 11	.21173E 9	.22348E 7	.23391E 5	.26416E 3
4.6	.22619E 11	.26233E 9	.27968E 7	.29492E 5	.33821E 3
5.5	.27346E 11	.32667E 9	.35232E 7	.37511E 5	.41525E 3
6.7	.33058E 11	.40938E 9	.44781E 7	.48221E 5	.53546E 3
8.1	.39958E 11	.51666E 9	.57515E 7	.62794E 5	.69399E 3
9.8	.48292E 11	.65837E 9	.74811E 7	.83256E 5	.93028E 3
11.8	.58352E 11	.84736E 9	.98809E 7	.11193E 6	.12681E 4
14.3	.70489E 11	.11056E 12	.13295E 8	.15433E 6	.17774E 4
17.3	.85119E 11	.14654E 10	.18293E 8	.21873E 6	.25761E 4
20.9	.10273E 12	.19798E 10	.25868E 8	.32047E 6	.38812E 4
25.3	.12398E 12	.27363E 10	.37764E 8	.46867E 6	.61318E 4
30.6	.14925E 12	.38851E 12	.57334E 8	.78168E 6	.10250E 5
37.1	.17949E 12	.56913E 10	.91153E 8	.13236E 7	.18314E 5
44.8	.21528E 12	.86364E 10	.15294E 9	.23962E 7	.35389E 5
54.2	.25711E 12	.13685E 11	.27281E 9	.46841E 7	.74863E 5
65.5	.30588E 12	.22225E 11	.52016E 9	.99768E 7	.17526E 6
79.3	.35811E 12	.37175E 11	.10639E 10	.23213E 8	.45739E 6
95.9	.41445E 12	.62558E 11	.23005E 10	.59808E 8	.13328E 7
115.9	.47142E 12	.10293E 12	.52375E 10	.16272E 9	.43226E 7
140.2	.52697E 12	.16137E 12	.12307E 11	.43262E 9	.15535E 8
169.6	.58207E 12	.23727E 12	.29246E 11	.15226E 10	.61308E 8
205.1	.62958E 12	.32519E 12	.65515E 11	.49796E 10	.26152E 9
248.1	.67405E 12	.41672E 12	.13220E 12	.16389E 11	.11574E 10
300.0	.71314E 12	.50467E 12	.22694E 12	.47750E 11	.50728E 10

Table 40C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N6	N7	N8	N9	N10
1.2	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
1.5	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
1.8	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
2.1	.20430E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
2.6	.22886E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
3.1	.22886E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
3.8	.22886E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
4.6	.22886E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
5.5	.25656E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
6.7	.25656E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
8.1	.28032E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
9.8	.31358E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
11.8	.34208E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
14.3	.39435E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
17.3	.52362E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
20.9	.67466E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
25.3	.94373E 2	.20430E 2	.20430E 2	.20430E 2	.20430E 2
30.6	.14919E 3	.22886E 2	.20430E 2	.20430E 2	.20430E 2
37.1	.26416E 3	.22886E 2	.20430E 2	.20430E 2	.20430E 2
44.8	.52215E 3	.28032E 2	.20430E 2	.20430E 2	.20430E 2
54.2	.11583E 4	.37059E 2	.20430E 2	.20430E 2	.20430E 2
65.5	.29267E 4	.67466E 2	.20430E 2	.20430E 2	.20430E 2
79.3	.84243E 4	.16534E 3	.22886E 2	.20430E 2	.20430E 2
95.9	.27797E 5	.56016E 3	.31358E 2	.20430E 2	.20430E 2
115.9	.10430E 6	.23428E 4	.69367E 2	.30430E 2	.20430E 2
140.2	.44455E 6	.11678E 5	.32522E 3	.25656E 2	.20430E 2
169.6	.21543E 7	.68267E 5	.20164E 4	.75362E 2	.22886E 2
205.1	.11626E 8	.45915E 6	.16531E 5	.57156E 3	.37059E 2
248.1	.67477E 8	.34333E 7	.15697E 6	.65894E 4	.27557E 3
300.0	.40266E 9	.27273E 8	.16373E 7	.89032E 5	.44651E 4

STOP

Table 40D

1.00E+17 300.0 -40.0E-21 * . + 3.9049966

NGAAS.

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
TEMPERATURE =300.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

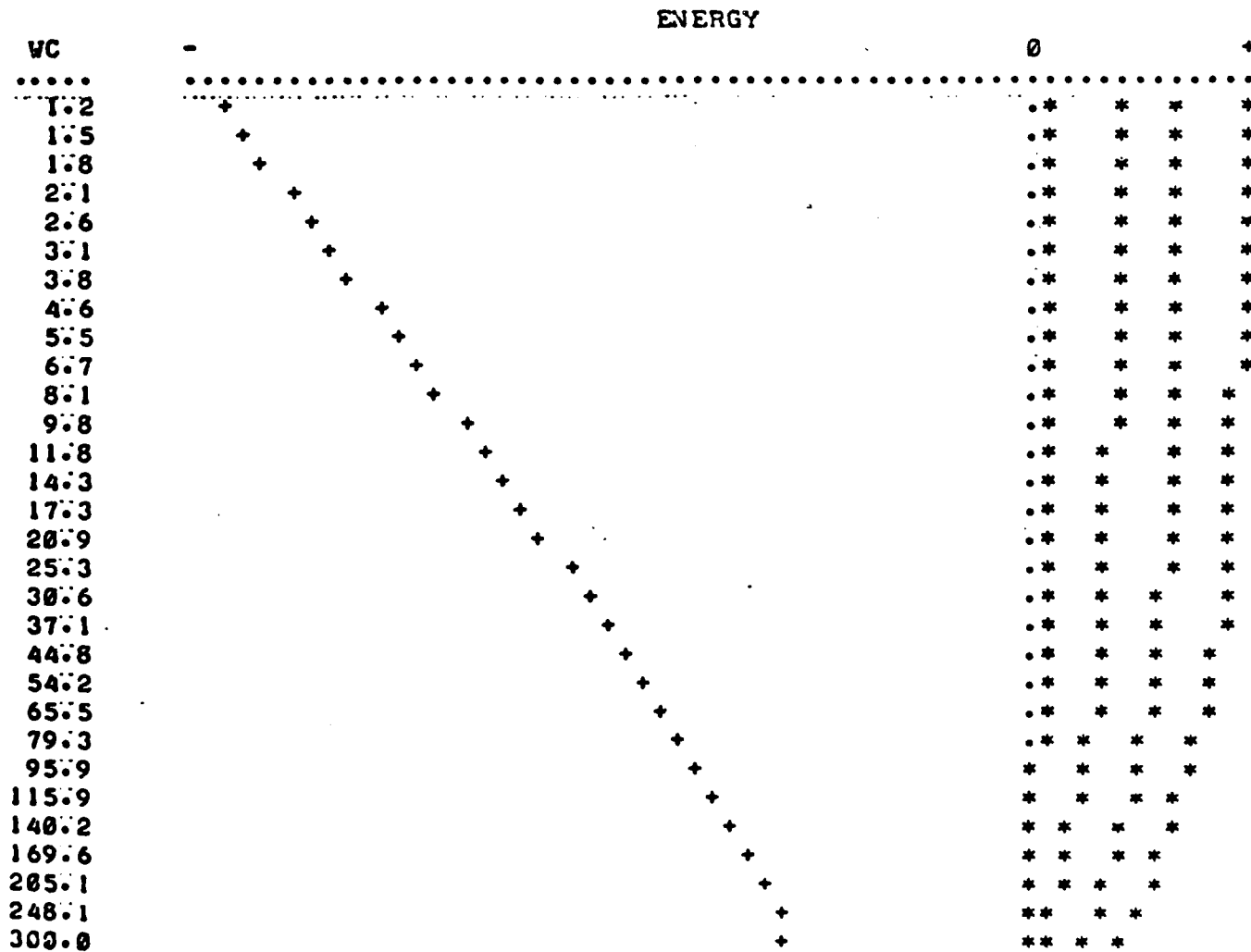


Figure 41

$W_c(\text{\AA})$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-181.795	6.762	20.358	33.967	47.582	61.200
1.5	-176.931	6.750	20.337	33.940	47.550	61.164
1.8	-172.012	6.735	20.312	33.903	47.512	61.120
2.1	-167.129	6.718	20.281	33.868	47.465	61.057
2.6	-162.251	6.697	20.244	33.821	47.408	61.033
3.1	-157.380	6.671	20.200	33.763	47.340	60.926
3.8	-152.519	6.640	20.146	33.694	47.258	60.832
4.6	-147.668	6.604	20.082	33.610	47.159	60.720
5.5	-142.830	6.559	20.004	33.509	47.039	60.534
6.7	-138.008	6.506	19.910	33.387	46.894	60.419
8.1	-133.204	6.442	19.797	33.240	46.720	60.221
9.8	-128.423	6.366	19.662	33.364	46.510	59.963
11.8	-123.668	6.275	19.499	32.852	46.258	59.696
14.3	-118.945	6.167	19.304	32.597	45.955	59.350
17.3	-114.260	6.039	19.071	32.291	45.590	58.935
20.9	-109.619	5.887	18.792	31.926	45.154	58.437
25.3	-105.032	5.709	18.462	31.489	44.631	57.840
30.6	-100.507	5.501	18.069	30.969	44.067	57.127
37.1	-96.054	5.261	17.606	30.352	43.265	56.276
44.8	-91.687	4.984	17.063	29.623	42.384	55.264
54.2	-87.416	4.671	16.429	28.765	41.344	54.035
65.5	-83.256	4.320	15.695	27.762	40.120	52.551
79.3	-79.222	3.935	14.854	26.593	38.691	50.992
95.9	-75.327	3.520	13.902	25.259	37.034	49.036
115.9	-71.585	3.084	12.838	23.736	35.131	46.822
140.2	-68.009	2.640	11.671	22.026	32.968	44.263
169.6	-64.609	2.203	10.418	20.138	30.545	41.368
205.1	-61.392	1.788	9.106	18.095	27.674	38.141
248.1	-58.360	1.412	7.773	15.935	24.991	34.609
300.0	-55.509	1.086	6.466	13.718	21.954	30.825

Table 41A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	74.820	88.442	102.065	115.690	129.315
1.5	74.780	88.399	102.019	115.640	129.262
1.8	74.732	88.346	101.962	115.579	129.198
2.1	74.673	88.282	101.894	115.506	129.121
2.6	74.602	88.205	101.811	115.418	129.028
3.1	74.517	88.112	101.711	115.312	128.915
3.8	74.414	88.000	101.590	115.183	128.779
4.6	74.289	87.864	101.444	115.028	128.615
5.5	74.138	87.700	101.268	114.840	128.416
6.7	73.956	87.502	101.055	114.614	128.177
8.1	73.737	87.264	100.799	114.340	127.888
9.8	73.473	86.976	100.489	114.011	127.539
11.8	73.155	86.630	100.116	113.613	127.118
14.3	72.772	86.212	99.667	113.134	126.611
17.3	72.311	85.710	99.127	112.558	126.001
20.9	71.758	85.107	98.477	111.865	125.267
25.3	71.095	84.383	97.697	111.032	124.335
30.6	70.301	83.516	96.762	110.034	123.326
37.1	69.353	82.479	95.643	108.838	122.059
44.8	68.224	81.243	94.328	107.410	120.543
54.2	66.883	79.773	92.718	105.708	118.735
65.5	65.298	78.031	90.332	103.687	116.506
79.3	63.433	75.978	88.604	101.295	114.040
95.9	61.251	73.569	85.985	98.479	111.038
115.9	58.717	70.762	82.924	95.181	107.516
140.2	55.800	67.518	79.376	91.347	103.413
169.6	52.479	63.805	75.299	86.928	98.670
205.1	48.748	59.608	70.667	81.887	93.242
248.1	44.622	54.932	65.476	76.211	87.106
300.0	40.149	49.816	59.756	69.920	80.271

Table 41B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N1		N2		N3		N4		N5
1.2	.49757E 9		.29405E 9		.17368E 9		.10256E 9		.60552E 8
1.5	.60153E 9		.35562E 9		.21010E 9		.12409E 9		.73276E 8
1.8	.72715E 9		.43308E 9		.25417E 9		.15015E 9		.83683E 8
2.1	.87891E 9		.52013E 9		.30756E 9		.18171E 9		.10735E 9
2.4	.10622E 10		.62903E 9		.37204E 9		.21993E 9		.12997E 9
3.1	.12836E 10		.76072E 9		.45318E 9		.26624E 9		.15740E 9
3.8	.15508E 10		.91993E 9		.54478E 9		.32236E 9		.19066E 9
4.6	.18733E 10		.11126E 10		.65935E 9		.39039E 9		.23102E 9
5.5	.22622E 10		.13454E 10		.79313E 9		.47293E 9		.28005E 9
6.7	.27311E 10		.16271E 10		.96638E 9		.57311E 9		.33963E 9
8.1	.32958E 10		.19676E 10		.11702E 10		.69479E 9		.41214E 9
9.8	.39756E 10		.23792E 10		.14174E 10		.84273E 9		.50048E 9
11.8	.47928E 10		.28769E 10		.17174E 10		.10226E 10		.60325E 9
14.3	.57742E 10		.34786E 10		.20817E 10		.12422E 10		.73993E 9
17.3	.69508E 10		.42057E 10		.25244E 10		.15108E 10		.90134E 9
20.9	.83589E 10		.50844E 10		.30629E 10		.18374E 10		.10995E 10
25.3	.10040E 11		.61453E 10		.37185E 10		.22385E 10		.13435E 10
30.6	.12041E 11		.74274E 10		.45176E 10		.27311E 10		.16451E 10
37.1	.14416E 11		.89739E 10		.54930E 10		.33377E 10		.20193E 10
44.8	.17221E 11		.10838E 11		.66853E 10		.40873E 10		.24858E 10
54.2	.20517E 11		.13383E 11		.81446E 10		.50166E 10		.30705E 10
65.5	.24365E 11		.15782E 11		.99334E 10		.61735E 10		.36076E 10
79.3	.28821E 11		.19016E 11		.12129E 11		.76194E 10		.47431E 10
95.9	.33933E 11		.22879E 11		.14824E 11		.94337E 10		.59383E 10
115.9	.39728E 11		.27463E 11		.18133E 11		.11719E 11		.74758E 10
140.2	.46208E 11		.32880E 11		.22187E 11		.14604E 11		.94352E 10
169.6	.53343E 11		.39196E 11		.27133E 11		.18249E 11		.12056E 11
205.1	.61064E 11		.46471E 11		.33122E 11		.22847E 11		.15434E 11
248.1	.69277E 11		.54710E 11		.40291E 11		.28609E 11		.19037E 11
300.0	.77877E 11		.63856E 11		.48738E 11		.35754E 11		.25544E 11

Table 41C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N6		N7		N8		N9		N10
1.2	.35747E 8		.21102E 8		.12456E 8		.73525E 7		.43398E 7
1.5	.43266E 8		.25544E 8		.15080E 8		.89023E 7		.52551E 7
1.8	.52374E 8		.30927E 8		.18261E 8		.10781E 8		.63652E 7
2.1	.63412E 8		.37452E 8		.22118E 8		.13061E 8		.77123E 7
2.4	.76795E 8		.45367E 8		.26798E 8		.15828E 8		.93480E 7
3.1	.93027E 8		.54973E 8		.32481E 8		.19189E 8		.11336E 8
3.8	.11273E 9		.66640E 8		.39387E 8		.23277E 8		.13754E 8
4.6	.13666E 9		.80822E 8		.47788E 8		.28252E 8		.16780E 8
5.5	.16576E 9		.98079E 8		.58020E 8		.34316E 8		.20293E 8
6.7	.20117E 9		.11911E 9		.70500E 8		.41720E 8		.24684E 8
8.1	.24432E 9		.14477E 9		.85749E 8		.50777E 8		.30061E 8
9.8	.29699E 9		.17614E 9		.10442E 9		.61881E 8		.36663E 8
11.8	.36139E 9		.21457E 9		.12733E 9		.75534E 8		.44792E 8
14.3	.44031E 9		.26178E 9		.15554E 9		.92375E 8		.54838E 8
17.3	.53729E 9		.31996E 9		.19040E 9		.11323E 9		.67309E 8
20.9	.65683E 9		.39192E 9		.23364E 9		.13919E 9		.82868E 8
25.3	.80472E 9		.48132E 9		.28757E 9		.17166E 9		.10240E 9
30.6	.98850E 9		.59295E 9		.35520E 9		.21256E 9		.12709E 9
37.1	.12180E 10		.73319E 9		.44063E 9		.26447E 9		.15858E 9
44.8	.15065E 10		.91064E 9		.54940E 9		.33095E 9		.19911E 9
54.2	.18713E 10		.11370E 10		.68918E 9		.41697E 9		.25190E 9
65.5	.23364E 10		.14283E 10		.87071E 9		.52960E 9		.32154E 9
79.3	.29344E 10		.18073E 10		.11093E 10		.67904E 9		.41475E 9
95.9	.37104E 10		.23058E 10		.14270E 10		.88029E 9		.54158E 9
115.9	.47269E 10		.29695E 10		.18562E 10		.11557E 10		.71726E 9
140.2	.60714E 10		.38639E 10		.24444E 10		.15391E 10		.96530E 9
169.6	.78652E 10		.50839E 10		.32628E 10		.20821E 10		.13225E 10
205.1	.10275E 11		.67656E 10		.44172E 10		.28645E 10		.18472E 10
248.1	.13524E 11		.91021E 10		.60651E 10		.40090E 10		.26324E 10
300.0	.17901E 11		.12361E 11		.84368E 10		.57041E 10		.38264E 10

STOP

Table 41D

1.00E+17 77.3 -10.0E-21 * . + 1.2747345

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
TEMPERATURE = 77.0DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

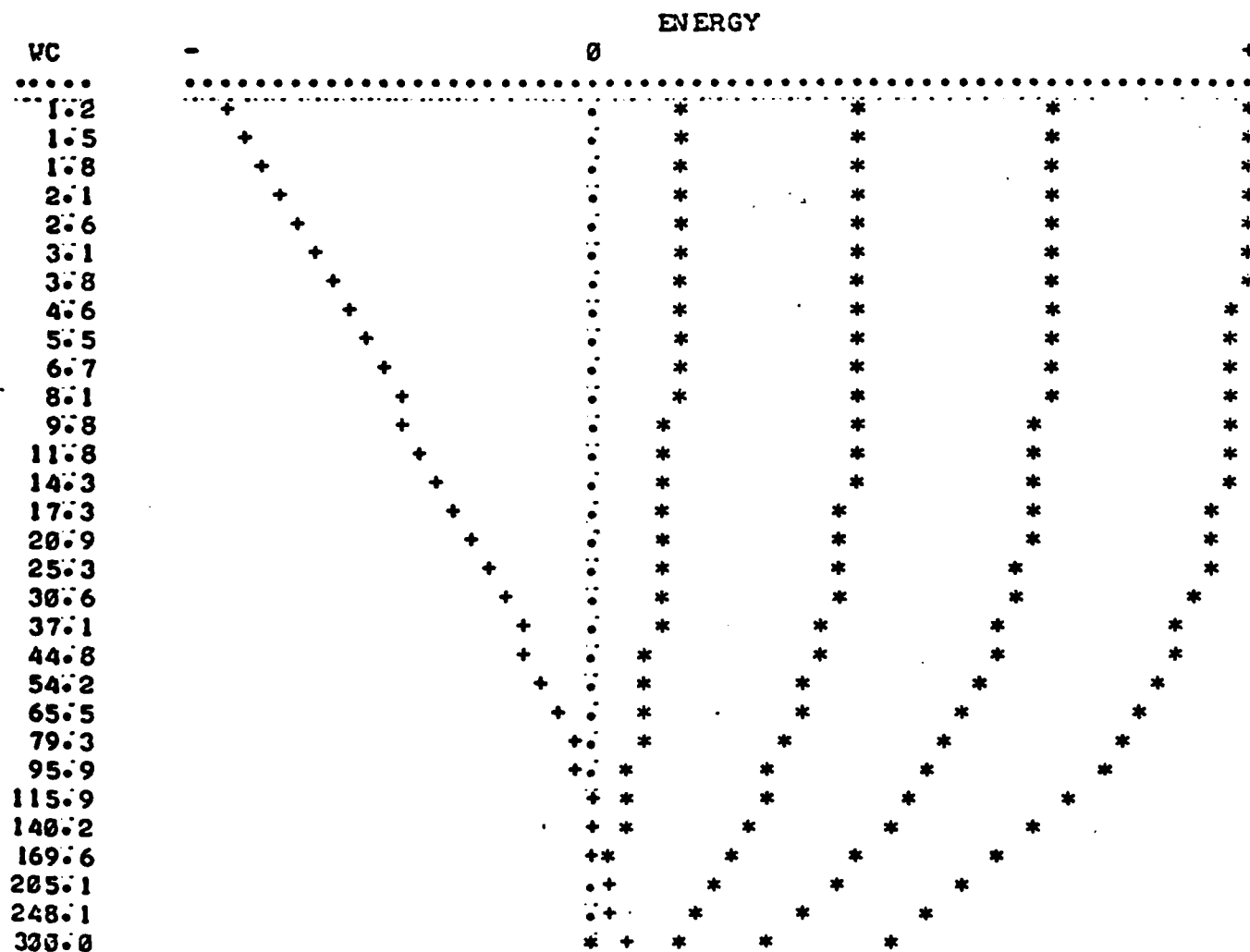


Figure 42

W_c (Å)	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	-27.623	6.762	20.358	33.967	47.582	61.200
1.5	-26.371	6.750	20.337	33.940	47.550	61.164
1.8	-25.122	6.735	20.312	33.908	47.512	61.120
2.1	-23.875	6.718	20.281	33.868	47.465	61.067
2.6	-22.631	6.697	20.244	33.821	47.408	61.003
3.1	-21.391	6.671	20.200	33.763	47.340	60.926
3.8	-20.155	6.640	20.146	33.694	47.258	60.832
4.6	-18.924	6.604	20.082	33.610	47.159	60.720
5.5	-17.699	6.559	20.004	33.509	47.039	60.584
6.7	-16.482	6.506	19.910	33.387	46.894	60.419
8.1	-15.273	6.442	19.797	33.243	46.720	60.221
9.8	-14.074	6.366	19.662	33.064	46.510	59.993
11.8	-12.888	6.275	19.499	32.852	46.258	59.696
14.3	-11.715	6.167	19.304	32.597	45.955	59.350
17.3	-10.560	6.039	19.071	32.291	45.590	58.935
20.9	-9.423	5.887	18.792	31.926	45.154	58.437
25.3	-8.339	5.709	18.462	31.489	44.631	57.840
30.6	-7.219	5.531	18.069	30.969	44.027	57.127
37.1	-6.157	5.261	17.606	30.352	43.265	56.276
44.8	-5.127	4.984	17.063	29.623	42.384	55.264
54.2	-4.129	4.671	16.429	28.765	41.344	54.065
65.5	-3.167	4.320	15.695	27.762	40.120	52.651
79.3	-2.242	3.935	14.854	26.598	38.691	50.992
95.9	-1.355	3.520	13.902	25.259	37.034	49.058
115.9	-.505	3.084	12.838	23.736	35.131	46.822
140.2	.306	2.640	11.671	22.026	32.968	44.263
169.6	1.077	2.203	10.418	20.138	30.545	41.368
205.1	1.806	1.788	9.106	18.095	27.874	38.141
248.1	2.489	1.412	7.773	15.935	24.991	34.609
300.0	3.123	1.086	6.466	13.718	21.954	30.825

Table 42A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	74.820	88.442	102.065	115.690	129.315
1.5	74.780	88.399	102.019	115.640	129.262
1.8	74.732	88.346	101.962	115.579	129.198
2.1	74.673	88.282	101.894	115.506	129.121
2.6	74.602	88.205	101.811	115.418	129.028
3.1	74.517	88.112	101.711	115.312	128.915
3.8	74.414	88.000	101.590	115.183	128.779
4.6	74.289	87.864	101.444	115.028	128.615
5.5	74.138	87.700	101.268	114.840	128.416
6.7	73.956	87.502	101.055	114.614	128.177
8.1	73.737	87.264	100.799	114.340	127.888
9.8	73.473	86.976	100.489	114.011	127.539
11.8	73.155	86.630	100.116	113.613	127.118
14.3	72.772	86.212	99.667	113.134	126.611
17.3	72.311	85.710	99.127	112.558	126.001
20.9	71.758	85.107	98.477	111.865	125.267
25.3	71.095	84.383	97.697	111.032	124.385
30.6	70.301	83.516	96.762	110.034	123.326
37.1	69.353	82.479	95.643	108.838	122.059
44.8	68.224	81.243	94.308	107.410	120.543
54.2	66.883	79.773	92.718	105.708	118.735
65.5	65.298	78.031	90.832	103.687	116.586
79.3	63.433	75.978	88.604	101.295	114.040
95.9	61.251	73.569	85.985	98.479	111.038
115.9	58.717	70.762	82.924	95.181	107.516
140.2	55.800	67.518	79.376	91.347	103.413
169.6	52.479	63.805	75.299	86.928	98.670
205.1	48.748	59.608	70.667	81.887	93.242
248.1	44.622	54.932	65.476	76.211	87.106
300.0	40.149	49.816	59.756	69.920	82.271

Table 42B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N1	N2	N3	N4	N5
1.2	.10534E 10	.13597E 9	.17478E 8	.22443E 7	.28804E 6
1.5	.12736E 10	.16470E 9	.21192E 8	.27233E 7	.34974E 6
1.8	.15399E 10	.19957E 9	.25710E 8	.33069E 7	.42522E 6
2.1	.18616E 10	.24192E 9	.31211E 8	.40189E 7	.51732E 6
2.6	.22504E 10	.29341E 9	.37919E 8	.48892E 7	.62970E 6
3.1	.27201E 10	.35605E 9	.46113E 8	.59552E 7	.76827E 6
3.8	.32875E 10	.43238E 9	.56142E 8	.72646E 7	.93852E 6
4.6	.39727E 10	.52551E 9	.68447E 8	.88779E 7	.11493E 7
5.5	.47998E 10	.63936E 9	.83588E 8	.12373E 8	.14110E 7
6.7	.57979E 10	.77884E 9	.10229E 9	.13351E 8	.17378E 7
8.1	.70016E 10	.95014E 9	.12547E 9	.16447E 8	.21483E 7
9.8	.84525E 10	.11612E 10	.15436E 9	.20337E 8	.26681E 7
11.8	.10200E 11	.14222E 10	.19059E 9	.25264E 8	.33319E 7
14.3	.12303E 11	.17462E 10	.23631E 9	.31559E 8	.41886E 7
17.3	.14830E 11	.21507E 10	.29451E 9	.39686E 8	.53080E 7
20.9	.17862E 11	.26584E 10	.36928E 9	.50308E 8	.67914E 7
25.3	.21493E 11	.33001E 10	.46645E 9	.64388E 8	.87903E 7
30.6	.25831E 11	.41172E 10	.59434E 9	.83363E 8	.11536E 8
37.1	.30996E 11	.51666E 10	.76514E 9	.10941E 9	.15391E 8
44.8	.37120E 11	.65269E 10	.99704E 9	.14593E 9	.20942E 8
54.2	.44341E 11	.83271E 10	.13177E 10	.19840E 9	.29161E 8
65.5	.52794E 11	.10360E 11	.17699E 10	.27575E 9	.41722E 8
79.3	.62592E 11	.13795E 11	.24210E 10	.39312E 9	.61596E 8
95.9	.73806E 11	.18020E 11	.33780E 10	.57665E 9	.94239E 8
115.9	.86431E 11	.23654E 11	.48124E 10	.87265E 9	.15003E 9
142.2	.10034E 12	.31222E 11	.69964E 10	.13645E 10	.24933E 9
169.6	.11528E 12	.41223E 11	.10353E 11	.22833E 10	.43305E 9
205.1	.13084E 12	.54108E 11	.15509E 11	.36646E 10	.78544E 9
248.1	.14651E 12	.70113E 11	.23311E 11	.62309E 10	.14822E 10
300.0	.16174E 12	.89031E 11	.34734E 11	.10706E 11	.28725E 10

Table 42C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N6	N7	N8	N9	N10
1.2	.36972E 5	.47607E 4	.62858E 3	.96924E 2	.31358E 2
1.5	.44915E 5	.57807E 4	.76066E 3	.11593E 3	.31358E 2
1.8	.54615E 5	.70308E 4	.91935E 3	.13588E 3	.34208E 2
2.1	.66490E 5	.85640E 4	.11165E 4	.16011E 3	.39435E 2
2.6	.81059E 5	.10444E 5	.13612E 4	.19292E 3	.42285E 2
3.1	.98990E 5	.12767E 5	.16596E 4	.23186E 3	.47512E 2
3.8	.12114E 6	.15638E 5	.20325E 4	.28079E 3	.53213E 2
4.6	.14860E 6	.19213E 5	.24986E 4	.34113E 3	.61290E 2
5.5	.18284E 6	.23682E 5	.30802E 4	.41525E 3	.72218E 2
6.7	.22578E 6	.29311E 5	.38176E 4	.51075E 3	.83620E 2
8.1	.28001E 6	.36453E 5	.47554E 4	.63428E 3	.99774E 2
9.8	.34910E 6	.45623E 5	.59641E 4	.79344E 3	.12163E 3
11.8	.43801E 6	.57450E 5	.75387E 4	.10015E 4	.14919E 3
14.3	.55376E 6	.73315E 5	.96216E 4	.12809E 4	.18530E 3
17.3	.70656E 6	.93740E 5	.12419E 5	.16567E 4	.23661E 3
20.9	.91154E 6	.12185E 6	.16251E 5	.21784E 4	.30532E 3
25.3	.11917E 7	.16076E 6	.21617E 5	.29125E 4	.40670E 3
30.6	.15830E 7	.21591E 6	.29325E 5	.39819E 4	.55493E 3
37.1	.21432E 7	.29625E 6	.40730E 5	.55083E 4	.77966E 3
44.8	.29682E 7	.41695E 6	.58179E 5	.83865E 4	.11336E 4
54.2	.42224E 7	.60481E 6	.85923E 5	.12139E 5	.17204E 4
65.5	.61991E 7	.90910E 6	.13199E 6	.19024E 5	.27376E 4
79.3	.94412E 7	.14244E 7	.21232E 6	.31352E 5	.46077E 4
95.9	.14996E 8	.23414E 7	.36323E 6	.54785E 5	.82646E 4
115.9	.24975E 8	.42632E 7	.64947E 6	.10236E 6	.15955E 5
142.2	.43806E 8	.74381E 7	.12531E 7	.20315E 6	.33451E 5
169.6	.81175E 8	.14721E 8	.26327E 7	.45083E 6	.76791E 5
205.1	.15903E 9	.33937E 8	.58400E 7	.12759E 7	.19423E 6
248.1	.32815E 9	.69393E 8	.14158E 8	.28062E 7	.54303E 6
300.0	.70794E 9	.16506E 9	.36894E 8	.79714E 7	.16743E 7

Table 42D

1.00E+17 4.2 - 1.0E-21 * . + 0.7754667

NGAAS

GRAPH OF ENERGY LEVELS VS. WC

DONOR CONCENTRATION = .1E 18/CUBIC CENTIMETER
TEMPERATURE = 4.2DEGREES KELVIN

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

ENERGY

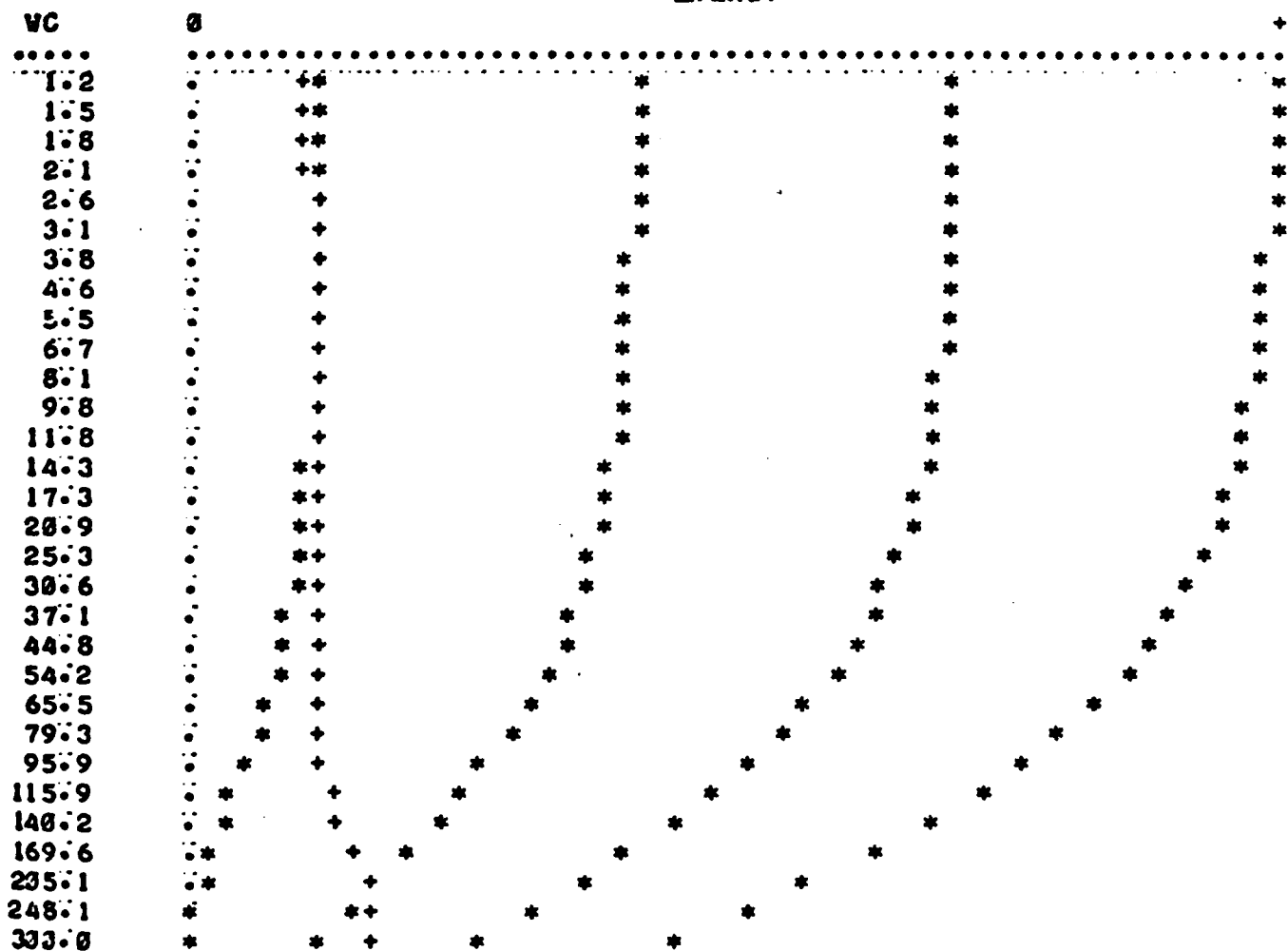


Figure 43

$W_c (A)$	E_f	EC(1)	EC(2)	EC(3)	EC(4)	EC(5)
1.2	6.009	6.762	20.358	33.967	47.582	61.232
1.5	6.072	6.750	20.337	33.940	47.550	61.164
1.8	6.130	6.735	20.312	33.908	47.512	61.120
2.1	6.188	6.718	20.281	33.868	47.465	61.067
2.6	6.244	6.697	20.244	33.821	47.408	61.023
3.1	6.297	6.671	20.230	33.763	47.340	60.926
3.8	6.348	6.640	20.146	33.694	47.258	60.832
4.6	6.395	6.604	20.082	33.610	47.159	60.720
5.5	6.437	6.559	20.004	33.509	47.039	60.584
6.7	6.475	6.506	19.910	33.387	46.894	60.419
8.1	6.508	6.442	19.797	33.240	46.720	60.221
9.8	6.535	6.366	19.662	33.064	46.510	59.983
11.8	6.555	6.275	19.499	32.852	46.258	59.696
14.3	6.568	6.167	19.304	32.597	45.955	59.350
17.3	6.574	6.039	19.071	32.291	45.590	58.935
20.9	6.574	5.887	18.792	31.926	45.154	58.437
25.3	6.569	5.729	18.462	31.489	44.631	57.840
30.6	6.561	5.501	18.069	30.969	44.007	57.127
37.1	6.555	5.261	17.606	30.352	43.265	56.276
44.8	6.557	4.984	17.063	29.623	42.384	55.264
54.2	6.577	4.671	16.429	28.765	41.344	54.065
65.5	6.627	4.320	15.695	27.762	40.120	52.651
79.3	6.726	3.935	14.854	26.598	38.691	50.992
95.9	6.895	3.520	13.902	25.259	37.034	49.058
115.9	7.166	3.084	12.838	23.736	35.131	46.822
140.2	7.577	2.640	11.671	22.026	32.968	44.263
169.6	8.173	2.203	10.418	20.138	30.545	41.368
205.1	8.861	1.788	9.106	18.095	27.874	38.141
248.1	8.952	1.412	7.773	15.935	24.991	34.629
300.0	9.057	1.086	6.466	13.718	21.954	30.825

Table 43A

ENERGY IN MILLI-ELECTRON VOLTS
WC IN ANGSTROMS

WC	EC(6)	EC(7)	EC(8)	EC(9)	EC(10)
1.2	74.820	88.442	102.065	115.690	129.315
1.5	74.780	88.399	102.019	115.640	129.262
1.8	74.732	88.346	101.962	115.579	129.198
2.1	74.673	88.282	101.894	115.506	129.121
2.6	74.602	88.205	101.811	115.418	129.028
3.1	74.517	88.112	101.711	115.312	128.915
3.8	74.414	88.000	101.590	115.183	128.779
4.6	74.289	87.864	101.444	115.028	128.615
5.5	74.138	87.700	101.268	114.840	128.416
6.7	73.956	87.502	101.055	114.614	128.177
8.1	73.737	87.264	100.799	114.340	127.888
9.8	73.473	86.976	100.489	114.011	127.539
11.8	73.155	86.630	100.116	113.613	127.118
14.3	72.772	86.212	99.667	113.134	126.611
17.3	72.311	85.710	99.127	112.558	126.001
20.9	71.758	85.107	98.477	111.865	125.267
25.3	71.095	84.383	97.697	111.032	124.385
30.6	70.331	83.516	96.762	110.034	123.326
37.1	69.353	82.479	95.643	108.838	122.059
44.8	68.224	81.243	94.308	107.410	120.543
54.2	66.883	79.773	92.718	105.708	118.735
65.5	65.298	78.031	90.832	103.687	116.586
79.3	63.433	75.978	88.604	101.295	114.040
95.9	61.251	73.569	85.985	98.479	111.038
115.9	58.717	70.762	82.924	95.181	107.516
140.2	55.800	67.518	79.376	91.347	103.413
169.6	52.479	63.805	75.299	86.928	98.670
205.1	48.748	59.638	70.667	81.887	93.242
248.1	44.622	54.932	65.476	76.211	87.106
300.0	40.149	49.816	59.756	69.920	80.271

Table 43B

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N1	N2	N3	N4	N5
1.2	.12895E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
1.5	.14627E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
1.8	.17692E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
2.1	.21395E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
2.4	.25675E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
3.1	.31291E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
3.8	.37847E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
4.6	.45771E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
5.5	.55358E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
6.7	.66947E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
8.1	.80971E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
9.8	.97923E 18	.11144E 1	.11144E 1	.11144E 1	.11144E 1
11.8	.11843E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
14.3	.14323E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
17.3	.17321E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
20.9	.20948E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
25.3	.25335E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
32.6	.33649E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
37.1	.37056E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
44.8	.44615E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
54.2	.54199E 11	.11144E 1	.11144E 1	.11144E 1	.11144E 1
65.5	.65549E 11	.12439E 1	.11144E 1	.11144E 1	.11144E 1
79.3	.79275E 11	.29025E 1	.11144E 1	.11144E 1	.11144E 1
95.9	.95873E 11	.41024E 2	.11144E 1	.11144E 1	.11144E 1
115.9	.11595E 12	.15988E 4	.11144E 1	.11144E 1	.11144E 1
140.2	.14023E 12	.12501E 6	.11144E 1	.11144E 1	.11144E 1
169.6	.16957E 12	.20689E 8	.11144E 1	.11144E 1	.11144E 1
205.1	.20089E 12	.42173E 10	.12439E 1	.11144E 1	.11144E 1
248.1	.21418E 12	.33877E 11	.43719E 2	.11144E 1	.11144E 1
300.0	.22642E 12	.73566E 11	.26103E 5	.11144E 1	.11144E 1

Table 43C

ELECTRON CONCENTRATION/SQUARE CENTIMETER
VC IN ANGSTROMS

VC	N6	N7	N8	N9	N10
1.2	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
1.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
2.4	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
3.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
4.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
5.5	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
6.7	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
8.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
9.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
11.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
14.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
17.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
20.9	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
25.3	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
32.6	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
37.1	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
44.8	.00000E 0	.00000E 0	.00000E 0	.00000E 0	.00000E 0
54.2	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
65.5	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
79.3	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
95.9	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
115.9	.11144E 1	.00000E 0	.00000E 0	.00000E 0	.00000E 0
140.2	.11144E 1	.11144E 1	.00000E 0	.00000E 0	.00000E 0
169.6	.11144E 1	.11144E 1	.00000E 0	.00000E 0	.00000E 0
205.1	.11144E 1	.11144E 1	.00000E 0	.00000E 0	.00000E 0
248.1	.11144E 1	.11144E 1	.11144E 1	.00000E 0	.00000E 0
300.0	.11144E 1	.11144E 1	.11144E 1	.11144E 1	.00000E 0

Table 43D

STOP

GRAPH OF ENERGY VS. ND

NS I/111

K1 = .190 K2 = .674 K3 = .258

RELATIVE PERMITTIVITY (EL) = 11.8

WC = 1.0ANGSTROMS

ENERGY

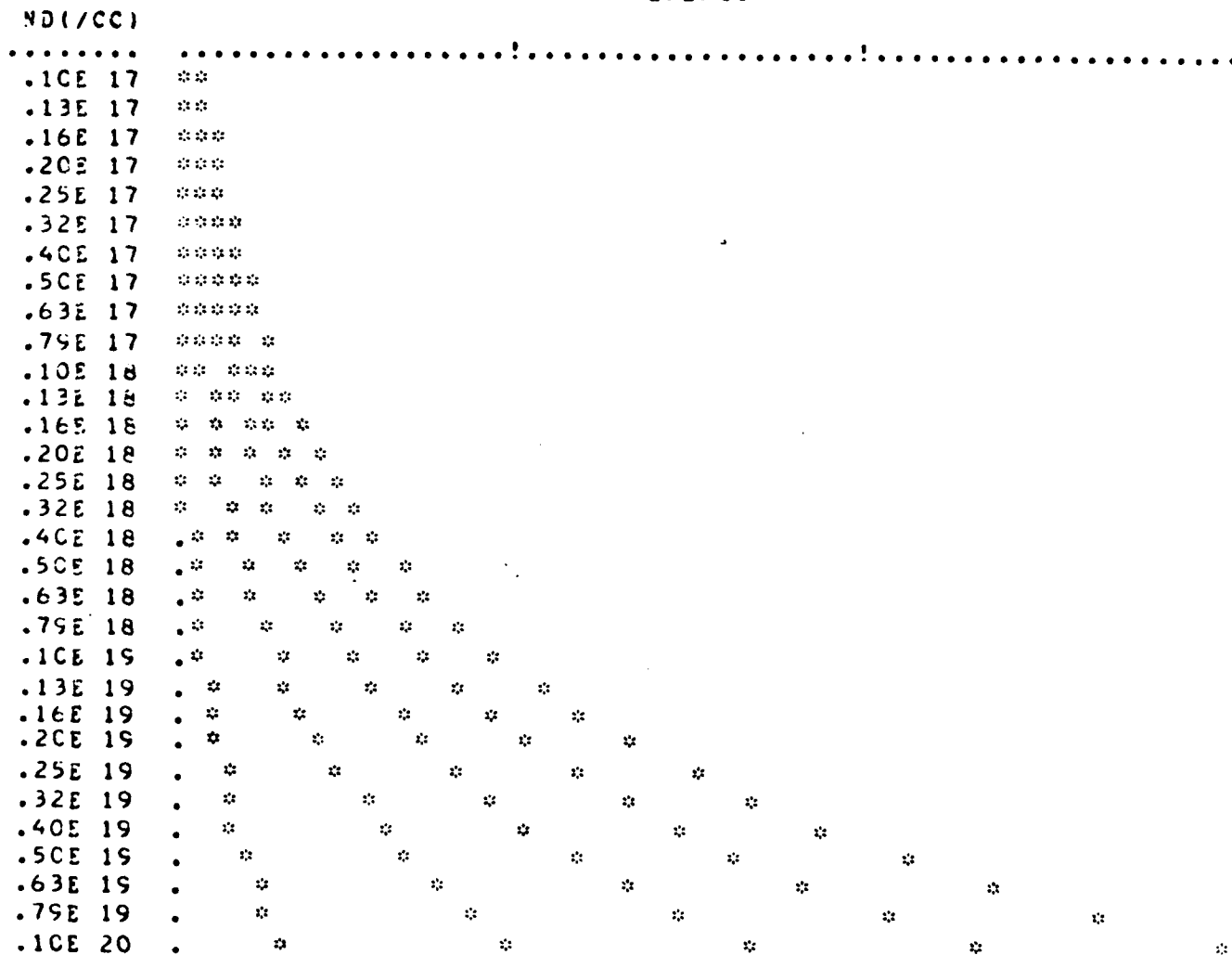


Figure 44

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	1.058	3.182	5.307	7.433	9.559
.13E 17	1.187	3.570	5.954	8.339	10.724
.16E 17	1.331	4.005	6.680	9.355	12.032
.20E 17	1.493	4.492	7.493	10.495	13.498
.25E 17	1.675	5.039	8.406	11.774	15.143
.32E 17	1.879	5.653	9.430	13.209	16.989
.40E 17	2.107	6.341	10.579	14.818	19.059
.50E 17	2.363	7.113	11.867	16.624	21.381
.63E 17	2.650	7.979	13.313	18.649	23.986
.79E 17	2.972	8.950	14.934	20.920	26.908
.10E 18	3.333	10.038	16.752	23.468	30.186
.13E 18	3.737	11.260	18.791	26.326	33.863
.16E 18	4.191	12.629	21.078	29.531	37.987
.20E 18	4.699	14.165	23.643	33.127	42.613
.25E 18	5.269	15.887	26.520	37.159	47.802
.32E 18	5.907	17.818	29.747	41.682	53.622
.40E 18	6.623	19.984	33.365	46.755	60.150
.50E 18	7.425	22.412	37.423	52.444	67.471
.63E 18	8.324	25.134	41.973	58.824	75.682
.79E 18	9.331	28.186	47.075	65.979	84.891
.10E 19	10.460	31.608	52.797	74.003	95.219
.13E 19	11.725	35.444	59.212	83.001	106.802
.16E 19	13.141	39.744	66.405	93.091	119.791
.20E 19	14.728	44.564	74.470	104.405	134.357
.25E 19	16.505	49.967	83.512	117.091	150.690
.32E 19	18.495	56.023	93.649	131.315	169.005
.40E 19	20.724	62.810	105.012	147.263	189.542
.50E 19	23.220	70.415	117.750	165.142	212.568
.63E 19	26.013	78.938	132.028	185.187	238.385
.79E 19	29.141	88.488	148.032	207.657	267.329
.10E 20	32.641	99.188	165.968	232.845	299.778

Table 44

GRAPH OF ENERGY VS. ND

NS I/111

K1 = .190 K2 = .674 K3 = .258

RELATIVE PERMITTIVITY (EL) = 11.8

WC = 25.0ANGSTROMS

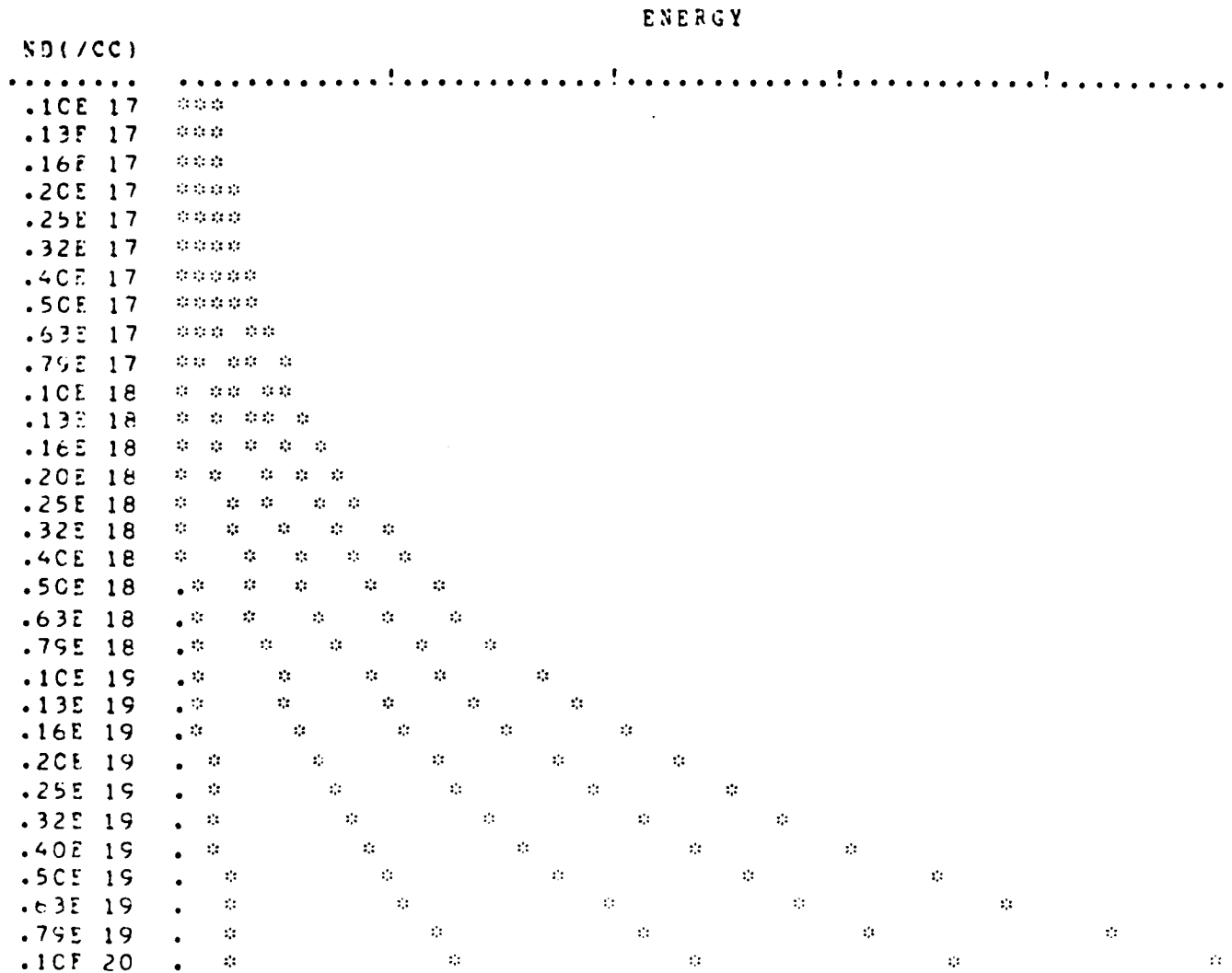


Figure 45

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.1CE 17	.930	2.953	5.008	7.078	9.155
.13E 17	1.035	3.298	5.599	7.917	10.244
.16E 17	1.151	3.682	6.259	8.855	11.462
.2CE 17	1.280	4.110	6.994	9.902	12.822
.25E 17	1.423	4.586	7.815	11.070	14.341
.32E 17	1.581	5.116	8.729	12.373	16.037
.4CE 17	1.755	5.705	9.747	13.827	17.930
.5CE 17	1.947	6.360	10.881	15.448	20.042
.63E 17	2.158	7.086	12.144	17.255	22.398
.79E 17	2.391	7.893	13.549	19.268	25.025
.10E 18	2.648	8.788	15.111	21.510	27.953
.13E 18	2.929	9.780	16.647	24.005	31.216
.16E 18	3.236	10.878	18.776	26.781	34.849
.20E 18	3.576	12.094	20.917	29.868	38.894
.25E 18	3.946	13.438	23.293	33.299	43.394
.32E 18	4.349	14.923	25.927	37.111	48.400
.4CE 18	4.789	16.562	28.846	41.342	53.963
.5CE 18	5.268	18.370	32.077	46.036	60.144
.63E 18	5.789	20.361	35.650	51.240	67.006
.79E 18	6.353	22.552	39.600	57.005	74.620
.1CE 19	6.963	24.959	43.962	63.388	83.063
.13E 19	7.622	27.601	48.774	70.447	92.417
.16E 19	8.332	30.498	54.076	78.249	102.773
.20E 19	9.094	33.668	59.913	86.863	114.231
.25E 19	9.911	37.133	66.331	96.366	126.895
.32E 19	10.784	40.914	73.380	106.836	140.880
.4CE 19	11.714	45.032	81.110	118.362	156.310
.50E 19	12.702	49.510	89.577	131.034	173.316
.63E 19	13.748	54.371	98.837	144.948	192.038
.79E 19	14.852	59.636	108.948	160.208	212.627
.10E 20	16.013	65.326	119.971	176.919	235.241

Table 45

GRAPH OF ENERGY VS. ND

NS I/111

K1 = .190 K2 = .674 K3 = .258

RELATIVE PERMITTIVITY (EL) = 11.8

WC = 50.0ANGSTROMS

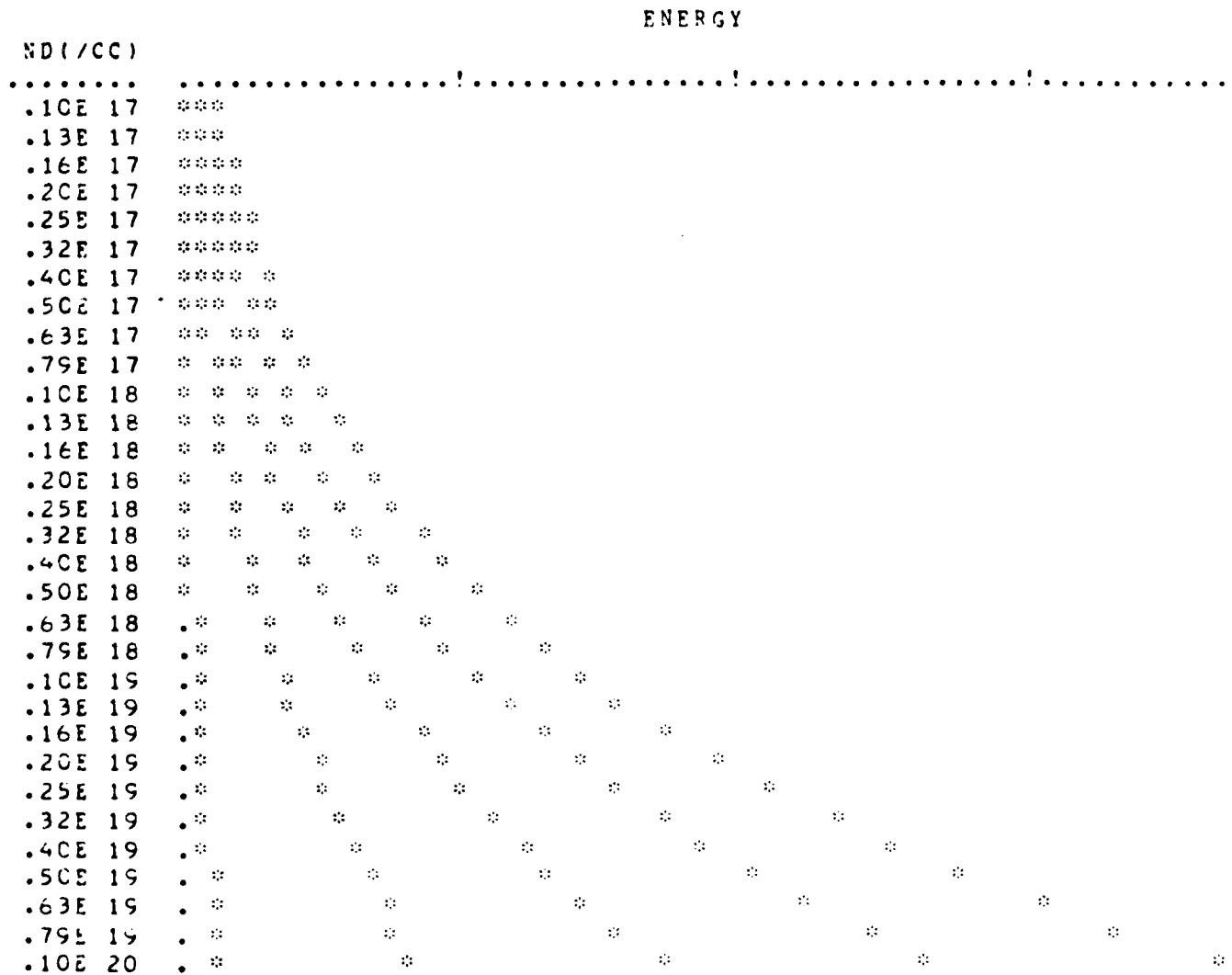


Figure 46

ND(°CC)	EC1	EC2	EC3	EC4	EC5
.1CE 17	.813	2.731	4.715	6.725	8.752
.13E 17	.898	3.037	5.253	7.501	9.767
.16E 17	.950	3.374	5.849	8.362	10.898
.2CE 17	1.052	3.747	6.510	9.319	12.154
.25E 17	1.202	4.158	7.243	10.381	13.551
.32E 17	1.322	4.612	8.054	11.560	15.103
.40E 17	1.453	5.112	8.951	12.867	16.826
.50E 17	1.594	5.662	9.943	14.314	18.738
.63E 17	1.747	6.266	11.038	15.916	20.857
.79E 17	1.913	6.929	12.246	17.688	23.206
.10E 18	2.090	7.656	13.576	19.647	25.806
.13E 18	2.282	8.451	15.041	21.809	28.682
.16E 18	2.486	9.321	16.652	24.194	31.861
.20E 18	2.705	10.269	18.421	26.822	35.372
.25E 18	2.938	11.302	20.361	29.715	39.245
.32E 18	3.186	12.426	22.486	32.895	43.513
.40E 18	3.448	13.645	24.809	36.387	48.212
.50E 18	3.725	14.965	27.346	40.217	53.379
.63E 18	4.016	16.392	30.111	44.410	59.055
.79E 18	4.320	17.931	33.121	48.995	65.279
.10E 19	4.638	19.586	36.389	54.001	72.098
.13E 19	4.968	21.362	39.932	59.457	79.556
.16E 19	5.310	23.263	43.765	65.394	87.700
.20E 19	5.662	25.291	47.902	71.841	96.579
.25E 19	6.023	27.449	52.357	78.828	106.244
.32E 19	6.391	29.737	57.142	86.385	116.743
.40E 19	6.766	32.156	62.269	94.541	128.126
.50E 19	7.144	34.705	67.747	103.322	140.443
.63E 19	7.524	37.379	73.583	112.753	153.741
.79E 19	7.904	40.176	79.781	122.854	168.064
.10E 20	8.283	43.089	86.342	133.645	183.454

Table 46

GRAPH OF ENERGY VS. ND

NS I/111

K1 = .190 K2 = .674 K3 = .258

RELATIVE PERMITTIVITY (EL) = 11.8

WC = 100.0ANGSTROMS

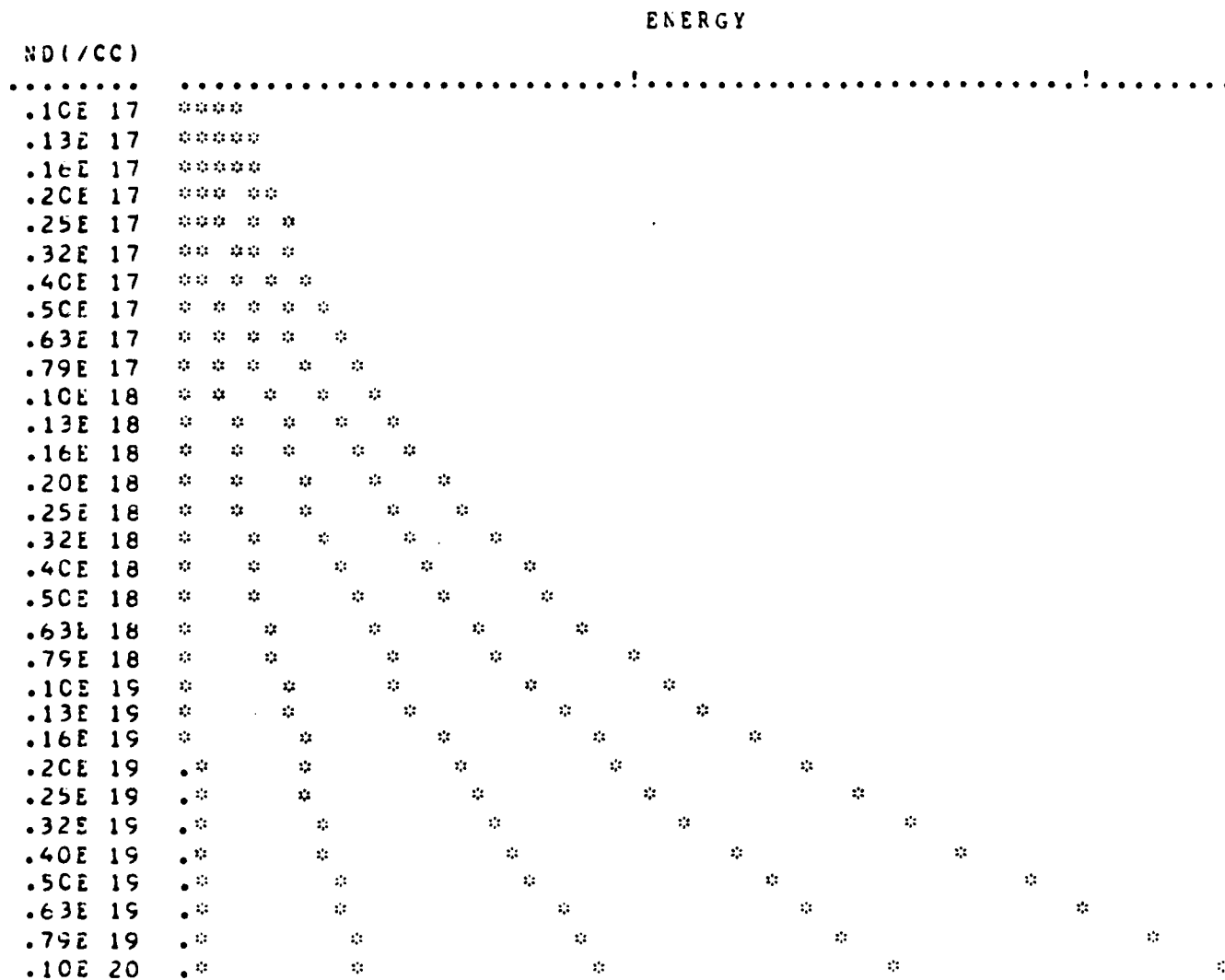


Figure 47

SD (CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	.624	2.340	4.180	6.074	8.000
.13E 17	.679	2.577	4.624	6.734	8.881
.16E 17	.737	2.837	5.111	7.460	9.853
.20E 17	.799	3.119	5.644	8.258	10.924
.25E 17	.865	3.424	6.227	9.135	12.104
.32E 17	.934	3.756	6.864	10.096	13.401
.40E 17	1.007	4.113	7.558	11.148	14.825
.50E 17	1.083	4.499	8.312	12.298	16.387
.63E 17	1.163	4.914	9.132	13.554	18.098
.79E 17	1.246	5.360	10.021	14.923	19.969
.10E 18	1.331	5.836	10.982	16.412	22.013
.13E 18	1.419	6.344	12.020	18.029	24.240
.16E 18	1.510	6.885	13.137	19.762	26.665
.20E 18	1.602	7.459	14.337	21.677	29.298
.25E 18	1.695	8.065	15.622	23.723	32.154
.32E 18	1.790	8.703	16.995	25.924	35.243
.40E 18	1.885	9.373	18.458	28.289	38.578
.50E 18	1.980	10.073	20.011	30.821	42.169
.63E 18	2.075	10.803	21.655	33.526	46.028
.79E 18	2.168	11.559	23.389	36.407	50.163
.10E 19	2.260	12.340	25.212	39.465	54.581
.13E 19	2.350	13.142	27.122	42.701	59.290
.16E 19	2.438	13.963	29.113	46.114	64.291
.20E 19	2.523	14.799	31.182	49.700	69.587
.25E 19	2.605	15.646	33.322	53.455	75.176
.32E 19	2.683	16.500	35.526	57.370	81.052
.40E 19	2.758	17.356	37.785	61.436	87.209
.50E 19	2.829	18.210	40.090	65.641	93.634
.63E 19	2.897	19.057	42.431	69.970	100.311
.79E 19	2.960	19.894	44.795	74.405	107.221
.10E 20	3.019	20.715	47.172	78.930	114.341

Table 47

GRAPH OF ENERGY VS. ND

NI NP

K1 = .077 K2 = .077 K3 = .077

RELATIVE PERMITTIVITY (EL) = 14.0

WC = 1.0ANGSTROMS

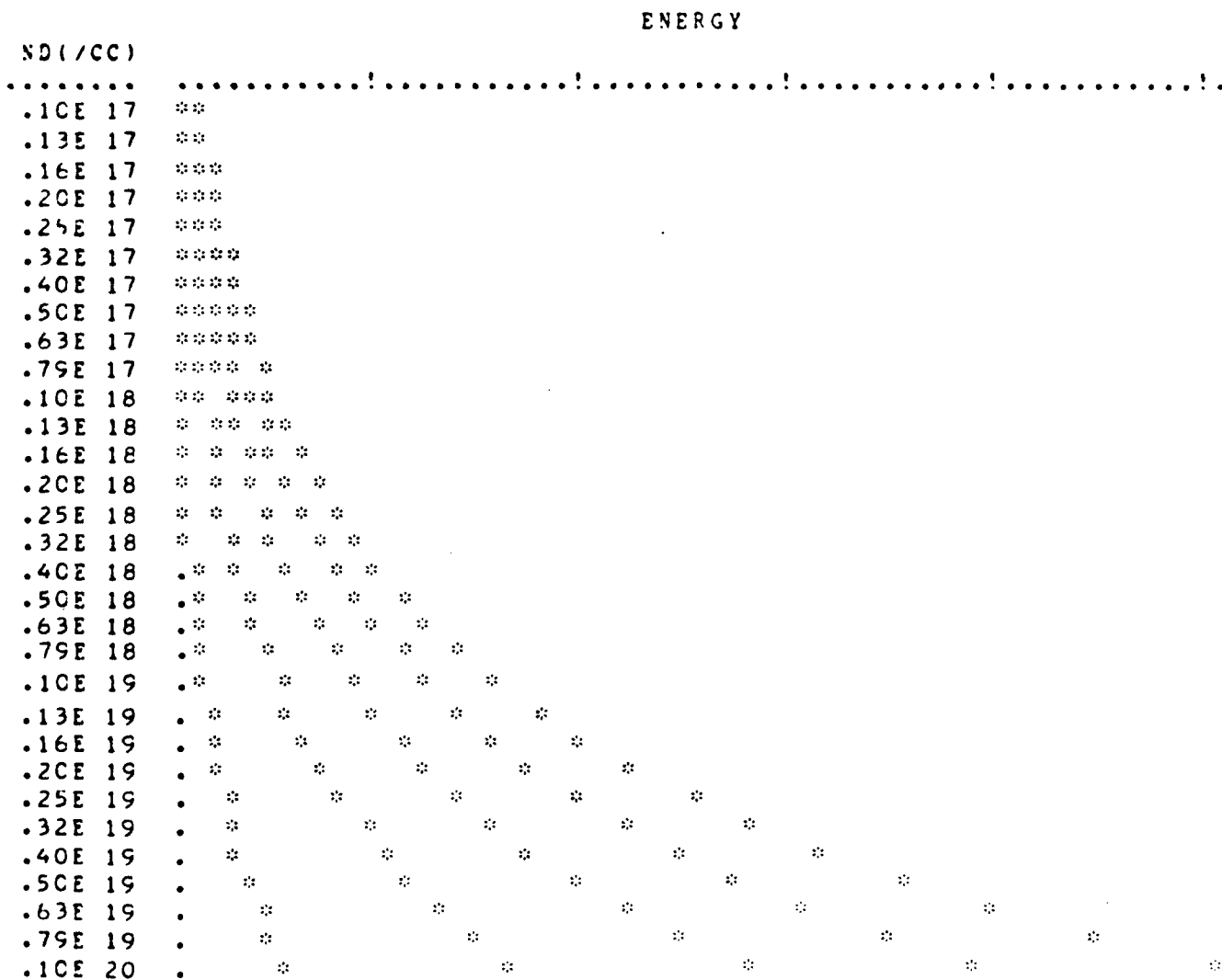


Figure 48

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	1.781	5.353	8.925	12.499	16.073
.13E 17	1.998	6.005	10.013	14.023	18.032
.16E 17	2.241	6.737	11.234	15.732	20.231
.20E 17	2.514	7.558	12.603	17.650	22.698
.25E 17	2.820	8.478	14.139	19.802	25.465
.32E 17	3.164	9.511	15.863	22.216	28.569
.40E 17	3.549	10.670	17.796	24.924	32.052
.50E 17	3.980	11.970	19.964	27.961	35.959
.63E 17	4.464	13.428	22.397	31.369	40.343
.79E 17	5.007	15.063	25.126	35.192	45.260
.10E 18	5.616	16.897	28.187	39.480	50.776
.13E 18	6.299	18.954	31.620	44.291	56.964
.16E 18	7.065	21.262	35.472	49.687	63.905
.20E 18	7.923	23.850	39.792	55.740	71.692
.25E 18	8.885	26.753	44.638	62.530	80.427
.32E 18	9.965	30.008	50.073	70.147	90.225
.40E 18	11.174	33.660	56.170	78.690	101.216
.50E 18	12.531	37.754	63.007	88.272	113.545
.63E 18	14.051	42.346	70.676	99.021	127.374
.79E 18	15.756	47.496	79.277	111.076	142.885
.10E 19	17.666	53.270	88.924	124.598	160.284
.13E 19	19.808	59.746	99.742	139.763	179.798
.16E 19	22.208	67.006	111.875	156.772	201.686
.20E 19	24.897	75.147	125.480	175.847	226.234
.25E 19	27.911	84.275	140.737	197.240	253.767
.32E 19	31.289	94.509	157.846	221.232	284.646
.40E 19	35.073	105.982	177.031	248.136	319.276
.50E 19	39.313	118.845	198.542	278.307	358.113
.63E 19	44.062	133.263	222.661	312.139	401.665
.79E 19	49.383	149.426	249.702	350.075	450.505
.10E 20	55.342	167.542	280.020	392.612	505.272

Table 48

GRAPH OF ENERGY VS. ND

NI NP

K1 = .077 K2 = .077 K3 = .077

RELATIVE PERMITTIVITY (EL) = 14.0

WC = 25.0ANGSTROMS

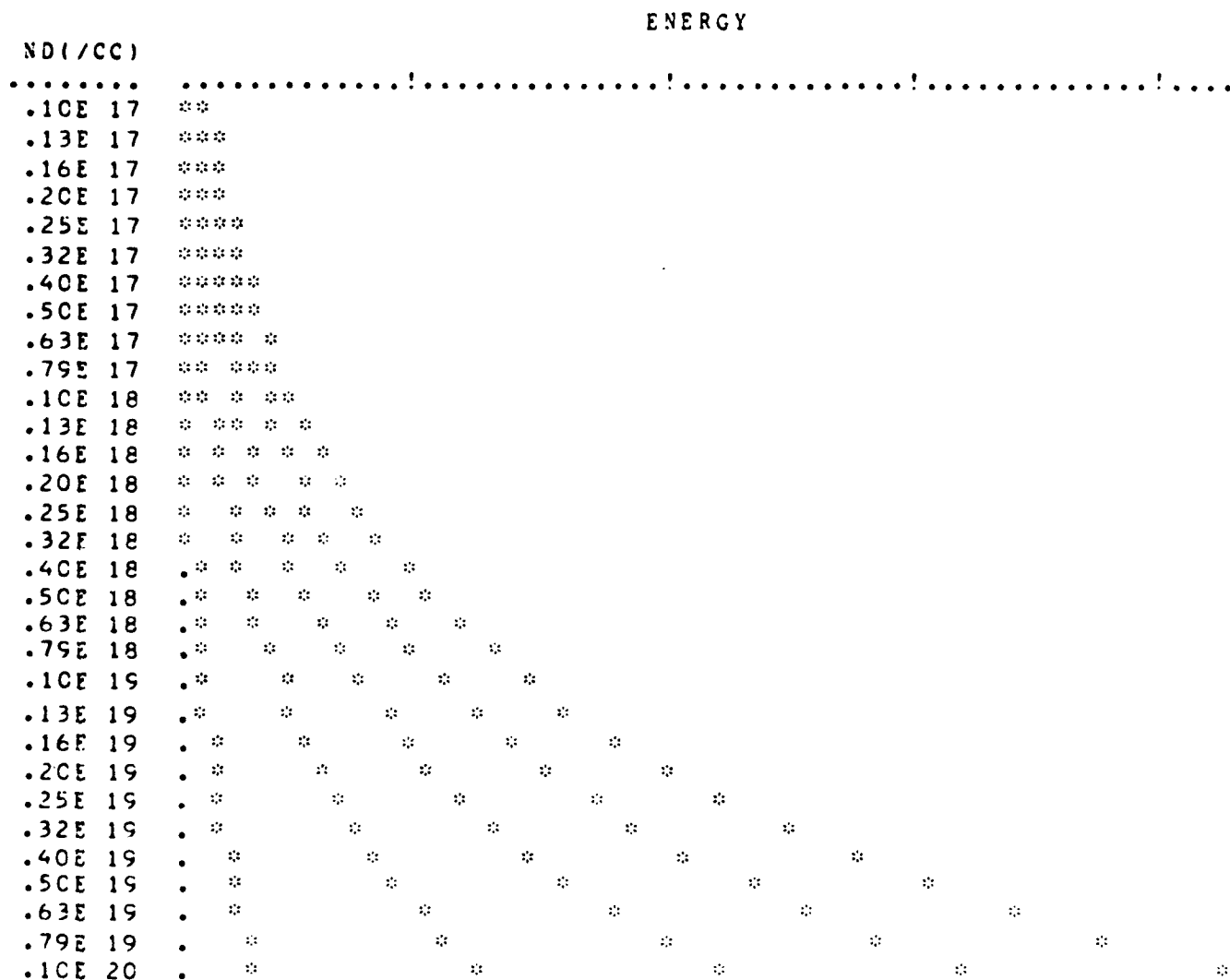


Figure 49

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	1.625	5.076	8.566	12.072	15.588
.13E 17	1.813	5.677	9.587	13.516	17.457
.16E 17	2.022	6.348	10.728	15.131	19.548
.20E 17	2.254	7.096	12.003	16.937	21.887
.25E 17	2.513	7.931	13.427	18.955	24.502
.32E 17	2.759	8.862	15.017	21.211	27.427
.40E 17	3.117	9.900	16.793	23.731	30.696
.50E 17	3.470	11.057	18.775	26.546	34.349
.63E 17	3.860	12.346	20.986	29.690	38.432
.79E 17	4.293	13.780	23.452	33.200	42.992
.10E 18	4.771	15.377	26.202	37.117	48.086
.13E 18	5.300	17.153	29.267	41.488	53.772
.16E 18	5.883	19.128	32.682	46.363	60.119
.20E 18	6.527	21.323	36.484	51.798	67.201
.25E 18	7.237	23.760	40.718	57.856	75.100
.32E 18	8.018	26.465	45.428	64.605	83.908
.40E 18	8.877	29.465	50.666	72.121	93.726
.50E 18	9.821	32.790	56.488	80.487	104.665
.63E 18	10.855	36.473	62.955	89.795	116.847
.79E 18	11.969	40.549	70.134	100.146	130.409
.10E 19	13.228	45.056	78.100	111.650	145.499
.13E 19	14.582	50.035	86.931	124.429	162.281
.16E 19	16.057	55.531	96.716	138.615	180.935
.20E 19	17.663	61.591	107.548	154.354	201.659
.25E 19	19.407	68.266	119.531	171.802	224.666
.32E 19	21.298	75.611	132.774	191.132	250.194
.40E 19	23.344	83.682	147.397	212.530	278.500
.50E 19	25.553	92.541	163.529	236.199	309.863
.63E 19	27.931	102.251	181.306	262.357	344.586
.79E 19	30.487	112.879	200.876	291.238	383.000
.10E 20	33.225	124.495	222.394	323.096	425.459

Table 49

GRAPH OF ENERGY VS. ND

NI NP

K1 = .077 K2 = .077 K3 = .077

RELATIVE PERMITTIVITY (EL) = 14.0

WC = 50.0ANGSTROMS

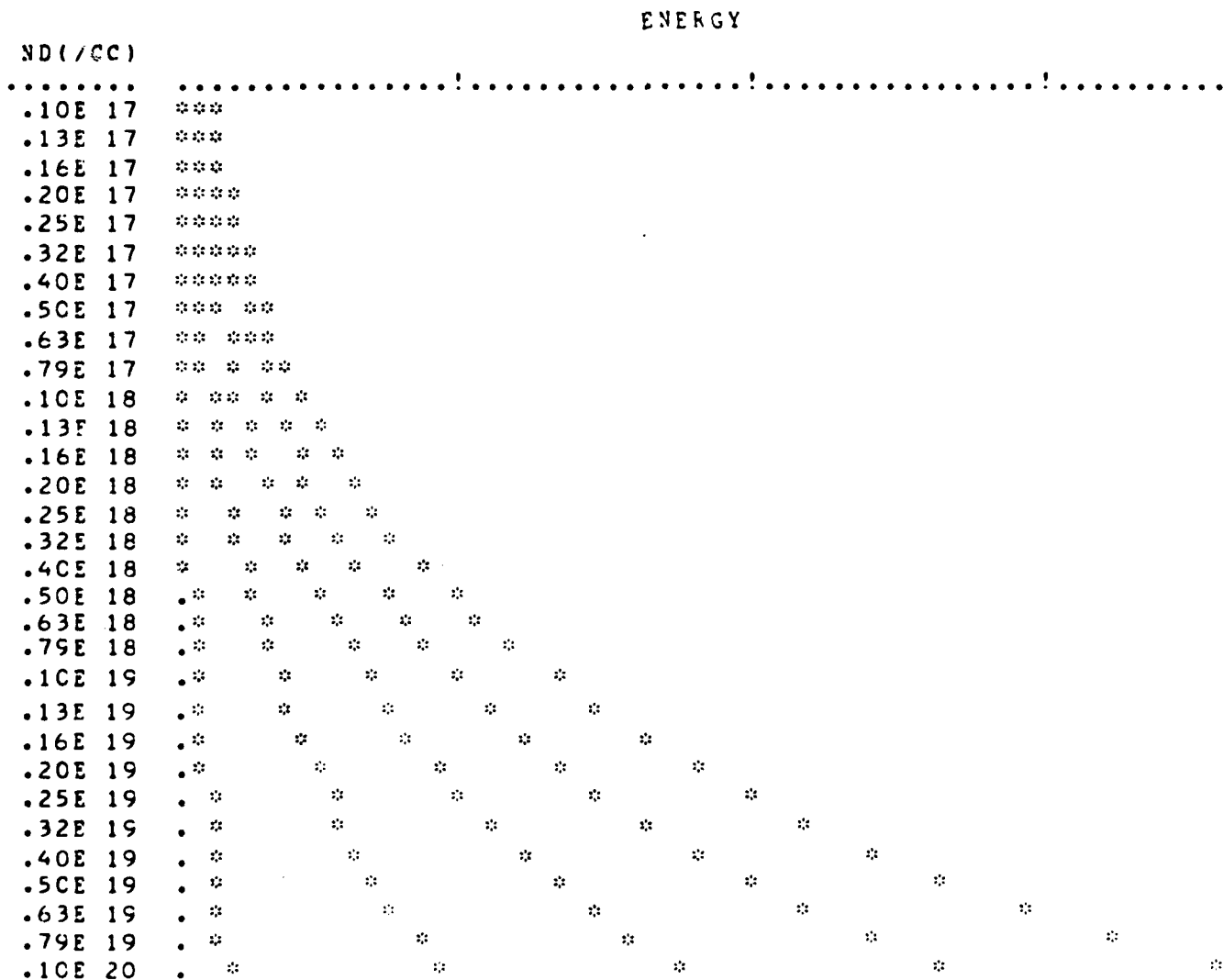


Figure 50

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	1.477	4.804	8.208	11.644	15.099
.13E 17	1.639	5.355	9.163	13.009	16.877
.16E 17	1.817	5.967	10.226	14.530	18.861
.20E 17	2.013	6.646	11.408	16.225	21.073
.25E 17	2.229	7.399	12.723	18.112	23.538
.32E 17	2.465	8.234	14.185	20.213	26.285
.40E 17	2.725	9.158	15.809	22.550	29.344
.50E 17	3.009	10.182	17.612	25.149	32.750
.63E 17	3.320	11.313	19.612	28.038	36.539
.79E 17	3.660	12.563	21.829	31.246	40.753
.10E 18	4.030	13.942	24.285	34.808	45.437
.13E 18	4.433	15.463	27.005	38.759	50.640
.16E 18	4.871	17.139	30.013	43.140	56.417
.20E 18	5.345	18.982	33.337	47.993	62.826
.25E 18	5.858	21.008	37.008	53.365	69.932
.32E 18	6.412	23.231	41.057	59.307	77.806
.40E 18	7.008	25.668	45.519	65.873	86.523
.50E 18	7.649	28.334	50.431	73.123	96.167
.63E 18	8.335	31.249	55.831	81.119	106.825
.79E 18	9.069	34.429	61.761	89.930	118.595
.10E 19	9.850	37.893	68.265	99.629	131.580
.13E 19	10.680	41.659	75.388	110.291	145.891
.16E 19	11.559	45.746	83.177	121.998	161.645
.20E 19	12.486	50.172	91.682	134.836	178.969
.25E 19	13.461	54.956	100.953	148.895	197.995
.32E 19	14.482	60.114	111.041	164.267	218.865
.40E 19	15.547	65.663	121.998	181.049	241.724
.50E 19	16.654	71.616	133.876	199.340	266.726
.63E 19	17.799	77.987	146.724	219.241	294.030
.79E 19	18.979	84.785	160.592	240.854	323.798
.10E 20	20.189	92.016	175.526	264.277	356.197

Table 50

GRAPH OF ENERGY VS. ND

NI NP

K1 = .077 K2 = .077 K3 = .077

RELATIVE PERMITTIVITY (EL) = 14.0

WC = 100.0ANGSTROMS

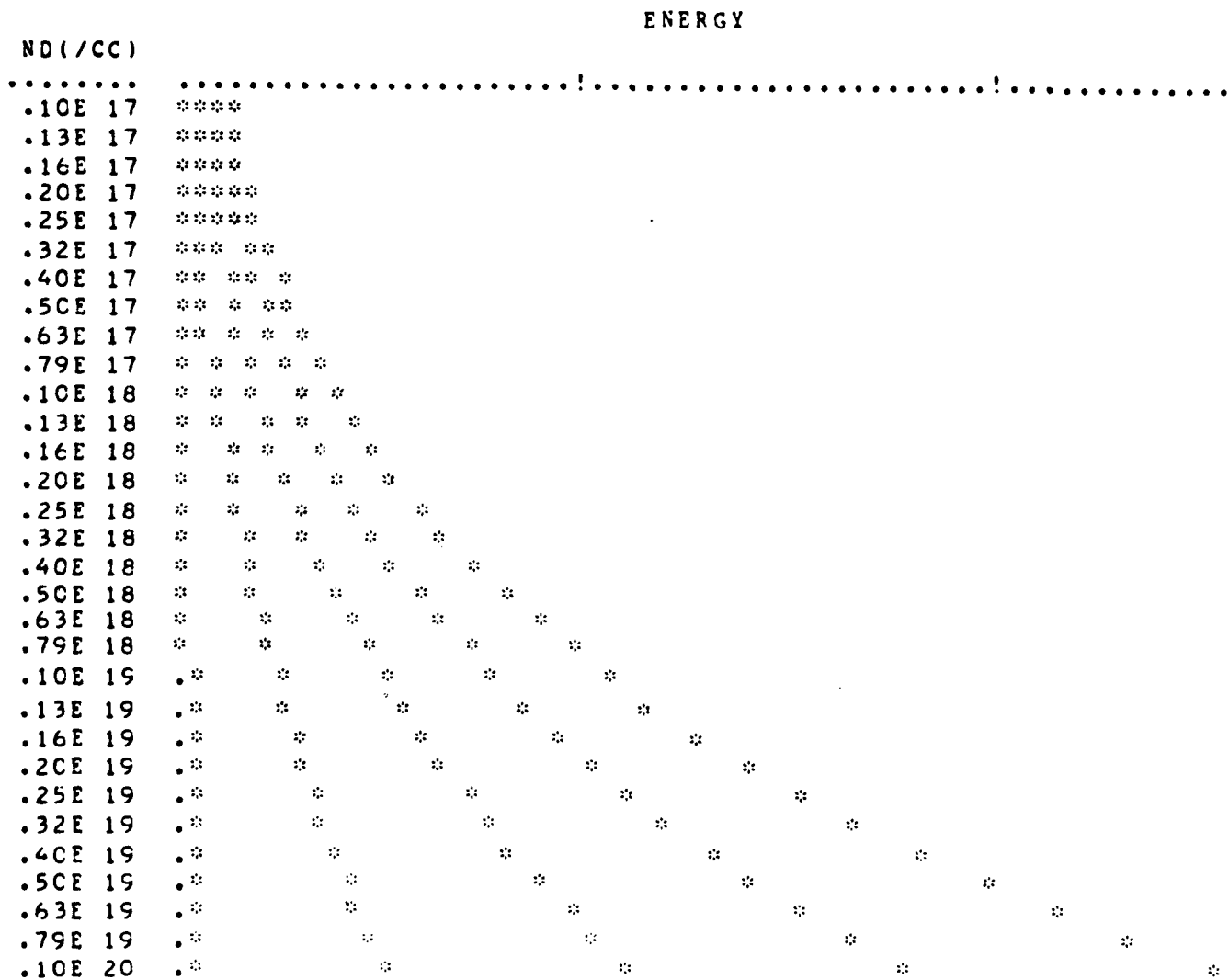


Figure 51

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	1.222	4.303	7.536	10.833	14.167
.13E 17	1.341	4.765	8.370	12.051	15.776
.16E 17	1.470	5.274	9.292	13.399	17.560
.20E 17	1.609	5.832	10.308	14.891	19.537
.25E 17	1.758	6.443	11.428	16.539	21.725
.32E 17	1.919	7.112	12.661	18.359	24.146
.40E 17	2.091	7.844	14.016	20.366	26.822
.50E 17	2.275	8.641	15.504	22.578	29.776
.63E 17	2.471	9.510	17.136	25.012	33.036
.79E 17	2.679	10.455	18.924	27.688	36.629
.10E 18	2.899	11.480	20.878	30.626	40.582
.13E 18	3.131	12.591	23.012	33.848	44.930
.16E 18	3.376	13.790	25.338	37.375	49.704
.20E 18	3.631	15.084	27.869	41.232	54.942
.25E 18	3.898	16.475	30.617	45.443	60.678
.32E 18	4.175	17.968	33.596	50.032	66.951
.40E 18	4.462	19.565	36.819	55.024	73.802
.50E 18	4.757	21.269	40.297	60.446	81.270
.63E 18	5.060	23.081	44.041	66.321	89.398
.79E 18	5.369	25.003	48.063	72.674	98.226
.10E 19	5.682	27.035	52.372	79.531	107.798
.13E 19	5.999	29.175	56.974	86.911	118.154
.16E 19	6.318	31.420	61.877	94.837	129.332
.20E 19	6.636	33.768	67.083	103.325	141.372
.25E 19	6.953	36.212	72.594	112.393	154.307
.32E 19	7.266	38.746	78.407	122.048	168.167
.40E 19	7.575	41.363	84.517	132.298	182.979
.50E 19	7.877	44.053	90.916	143.145	198.760
.63E 19	8.171	46.804	97.590	154.585	215.525
.79E 19	8.456	49.605	104.523	166.605	233.275
.10E 20	8.730	52.443	111.695	179.189	252.007

Table 51

GRAPH OF ENERGY VS. ND

NS I/111

K1 = .190 K2 = .674 K3 = .258

RELATIVE PERMITTIVITY (EL) = 11.9

WC = 300.0ANGSTROMS

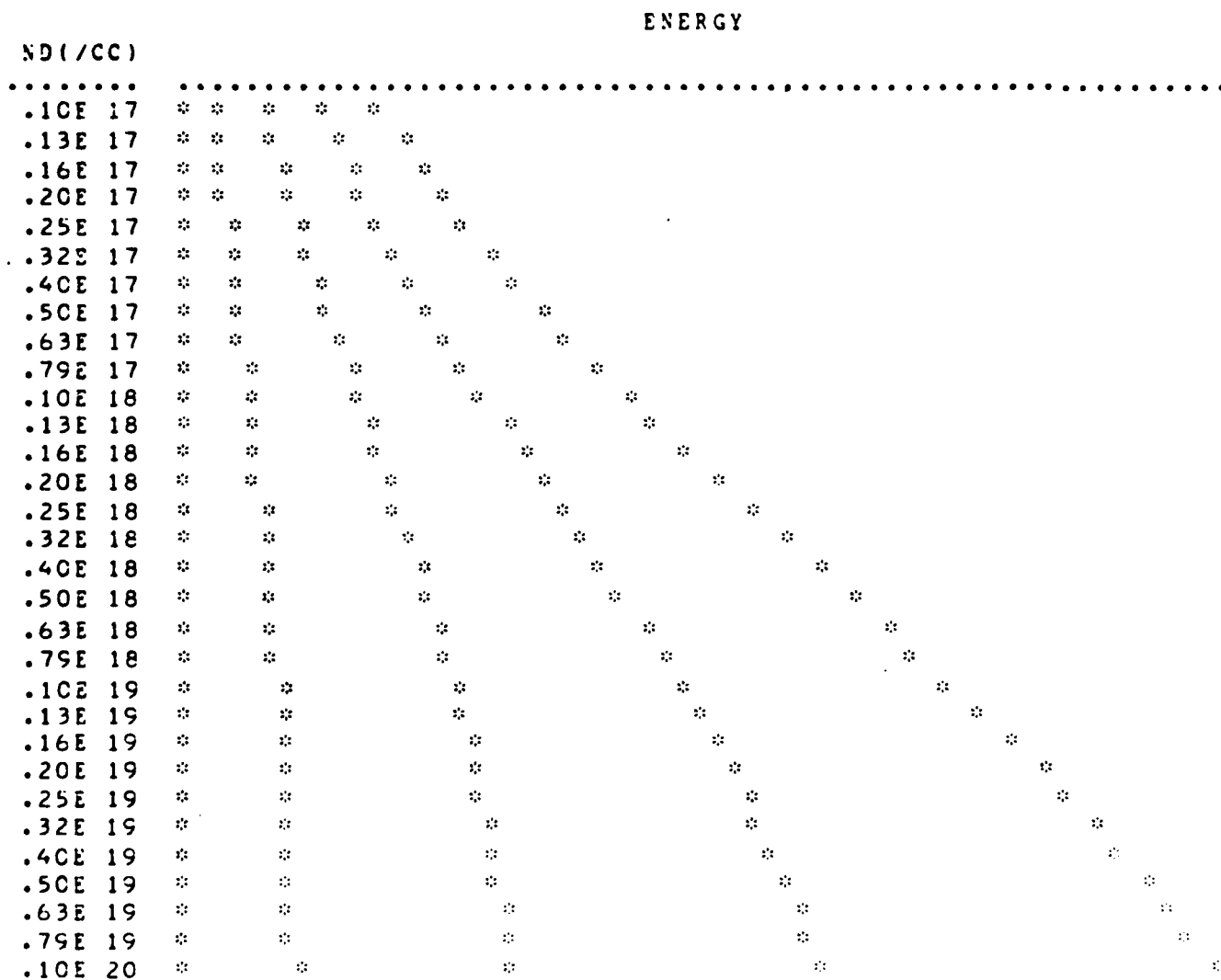


Figure 52

ND (/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	.242	1.292	2.616	4.073	5.614
.13E 17	.252	1.379	2.819	4.415	6.108
.16E 17	.262	1.468	3.032	4.776	6.634
.20E 17	.272	1.559	3.254	5.157	7.192
.25E 17	.281	1.652	3.485	5.557	7.783
.32E 17	.290	1.746	3.723	5.976	8.407
.40E 17	.299	1.841	3.968	6.412	9.063
.50E 17	.307	1.937	4.220	6.865	9.749
.63E 17	.315	2.031	4.476	7.234	10.466
.79E 17	.322	2.125	4.737	7.816	11.210
.10E 18	.329	2.218	5.000	8.310	11.980
.13E 18	.336	2.309	5.264	8.813	12.773
.16E 18	.342	2.398	5.528	9.324	13.586
.20E 18	.348	2.485	5.790	9.839	14.415
.25E 18	.353	2.568	6.050	10.357	15.258
.32E 18	.358	2.648	6.305	10.874	16.109
.40E 18	.362	2.725	6.555	11.388	16.964
.50E 18	.366	2.797	6.798	11.896	17.820
.63E 18	.370	2.866	7.033	12.396	18.671
.79E 18	.374	2.931	7.259	12.884	19.513
.10E 19	.377	2.993	7.477	13.360	20.341
.13E 19	.380	3.050	7.684	13.819	21.153
.16E 19	.382	3.103	7.880	14.262	21.942
.20E 19	.384	3.152	8.065	14.686	22.707
.25E 19	.387	3.198	8.240	15.090	23.445
.32E 19	.388	3.240	8.403	15.474	24.151
.40E 19	.390	3.278	8.556	15.835	24.825
.50E 19	.392	3.314	8.697	16.176	25.465
.63E 19	.393	3.346	8.828	16.494	26.070
.79E 19	.394	3.375	8.949	16.791	26.639
.10E 20	.395	3.402	9.061	17.067	27.172

Table 52

GRAPH OF ENERGY VS. ND

NG AAS

K1 = .068 K2 = .068 K3 = .068

RELATIVE PERMITTIVITY (EL) = 10.9

WC = 1.0ANGSTROMS

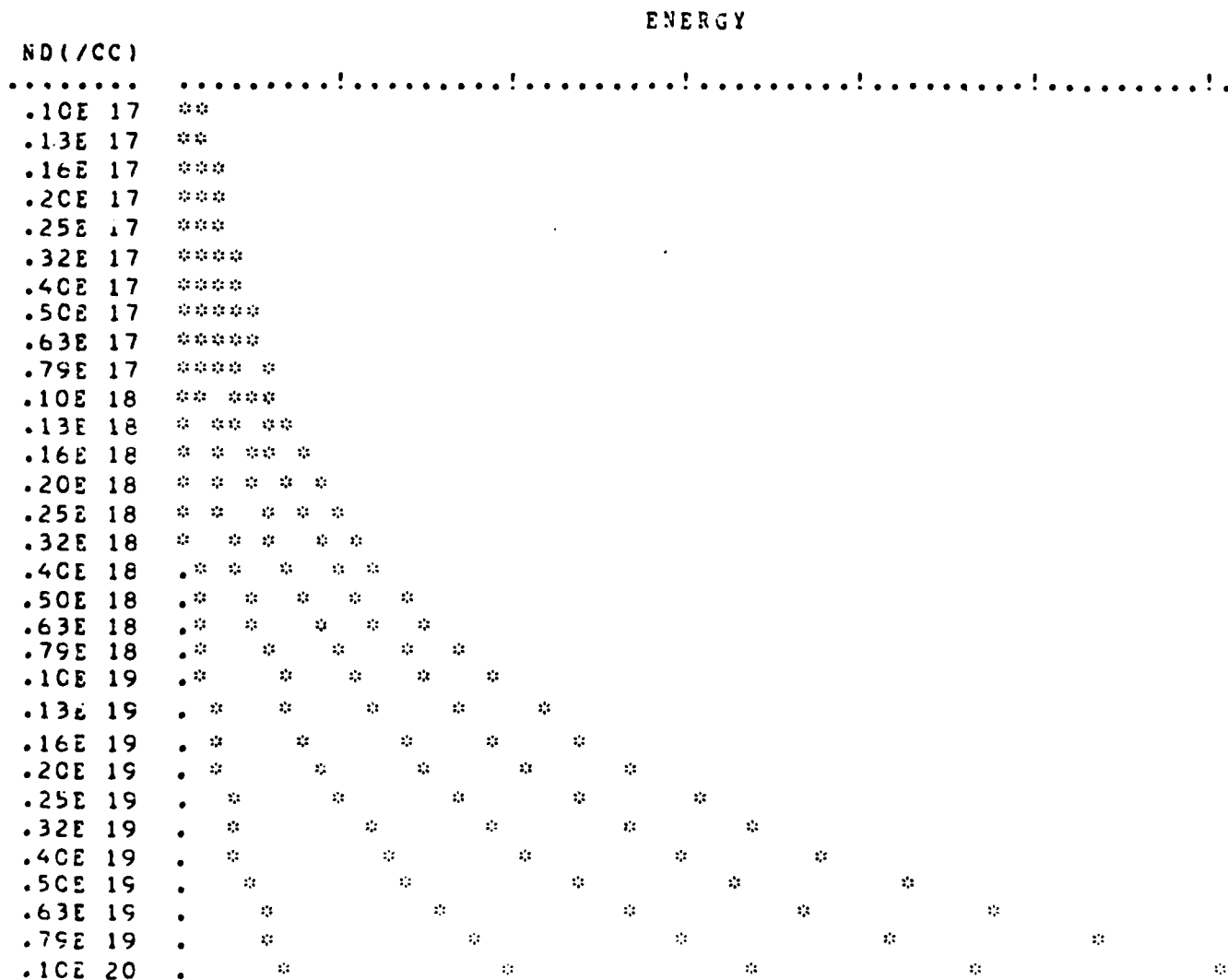


Figure 53

ND (/CC)	EC1	EC2	EC3	EC4	EC5
.1CE 17	2.148	6.455	10.763	15.073	19.383
.13E 17	2.409	7.241	12.075	16.910	21.746
.16E 17	2.703	8.124	13.547	18.972	24.397
.2CE 17	3.032	9.113	15.198	21.285	27.372
.25E 17	3.401	10.224	17.051	23.879	30.709
.32E 17	3.815	11.469	19.129	26.790	34.452
.4CE 17	4.279	12.867	21.460	30.055	38.652
.5CE 17	4.799	14.434	24.075	33.718	43.364
.63E 17	5.383	16.192	27.008	37.828	48.649
.79E 17	6.033	18.163	30.299	42.438	54.579
.1CE 18	6.772	20.375	33.990	47.609	61.230
.13E 18	7.595	22.856	38.130	53.409	68.692
.16E 18	8.518	25.638	42.774	59.916	77.062
.2CE 18	9.552	28.759	47.983	67.215	86.452
.25E 18	10.713	32.259	53.826	75.403	96.985
.32E 18	12.014	36.184	60.380	84.586	108.799
.40E 18	13.472	40.586	67.730	94.888	122.052
.5CE 18	15.107	45.523	75.975	106.442	136.918
.63E 18	16.940	51.059	85.221	119.402	153.593
.79E 18	18.994	57.267	95.592	133.938	172.296
.1CE 19	21.297	64.229	107.222	150.241	193.275
.13E 19	23.876	72.035	120.265	168.526	216.604
.16E 19	26.770	80.788	134.893	189.033	243.195
.2CE 19	30.012	90.602	151.296	212.032	272.793
.25E 19	33.644	101.606	169.690	237.825	305.989
.32E 19	37.714	113.942	190.316	266.750	343.219
.40E 19	42.275	127.773	213.444	299.187	384.972
.50E 19	47.383	143.277	239.376	335.560	431.795
.63E 19	53.106	160.656	268.451	376.347	484.303
.79E 19	59.516	180.137	301.049	422.082	543.184
.1CE 20	66.695	201.973	337.595	473.361	609.211

Table 53

GRAPH OF ENERGY VS. ND

NG AAS

K1 = .068 K2 = .068 K3 = .068

RELATIVE PERMITTIVITY (EL) = 10.9

WC = 25.0ANGSTROMS

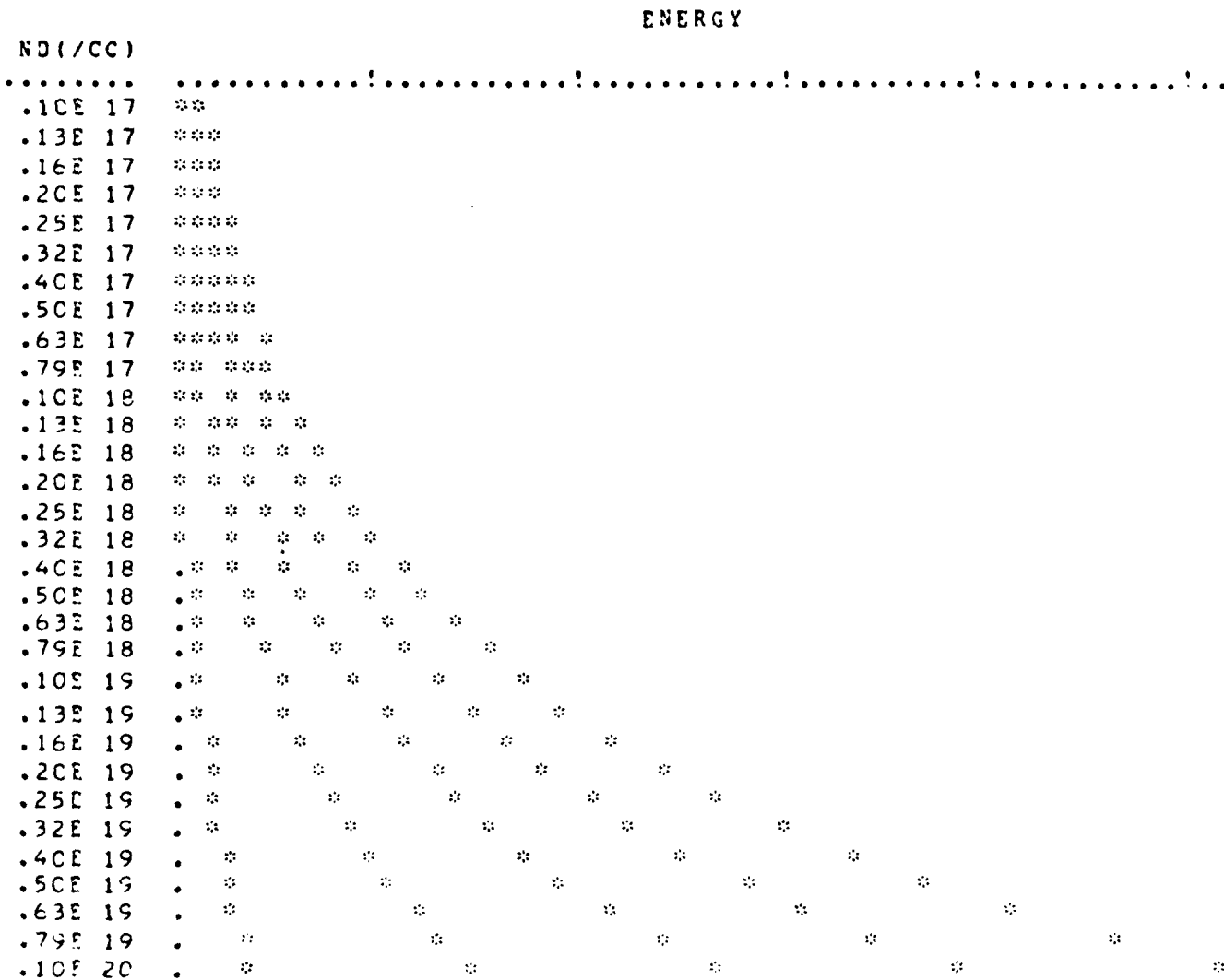


Figure 54

ND (/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	1.954	6.111	10.317	14.542	18.780
.13E 17	2.179	6.833	11.545	16.281	21.030
.16E 17	2.430	7.640	12.918	18.224	23.548
.20E 17	2.709	8.540	14.452	20.398	26.363
.25E 17	3.018	9.543	16.165	22.826	29.511
.32E 17	3.362	10.662	18.078	25.540	33.031
.40E 17	3.743	11.910	20.213	28.572	36.965
.50E 17	4.165	13.299	22.595	31.959	41.362
.63E 17	4.633	14.847	25.254	35.740	46.273
.79E 17	5.150	16.570	28.218	39.961	51.759
.10E 18	5.722	18.486	31.522	44.671	57.885
.13E 18	6.355	20.618	35.204	49.925	64.724
.16E 18	7.052	22.987	39.306	55.784	72.355
.20E 18	7.821	25.619	43.373	62.315	80.868
.25E 18	8.668	28.541	48.955	69.593	90.363
.32E 18	9.600	31.783	54.608	77.699	100.947
.40E 18	10.624	35.377	60.893	86.724	112.743
.50E 18	11.748	39.360	67.876	96.768	125.882
.63E 18	12.980	43.768	75.630	107.939	140.511
.79E 18	14.328	48.645	84.237	120.359	156.793
.10E 19	15.801	54.035	93.781	134.158	174.905
.13E 19	17.408	59.987	104.359	149.480	195.042
.16E 19	19.158	66.553	116.074	166.484	217.418
.20E 19	21.061	73.789	129.038	185.342	242.268
.25E 19	23.126	81.754	143.371	206.240	269.848
.32E 19	25.363	90.513	159.205	229.383	300.438
.40E 19	27.779	100.131	176.680	254.991	334.343
.50E 19	30.384	110.681	195.947	283.303	371.894
.63E 19	33.186	122.236	217.166	314.576	413.452
.79E 19	36.193	134.873	240.510	349.088	459.405
.10E 20	39.409	148.672	266.161	387.135	510.173

Table 54

GRAPH OF ENERGY VS. ND

NG AAS

K1 = .068 K2 = .068 K3 = .068

RELATIVE PERMITTIVITY (EL) = 10.9

WC = 50.0ANGSTROMS

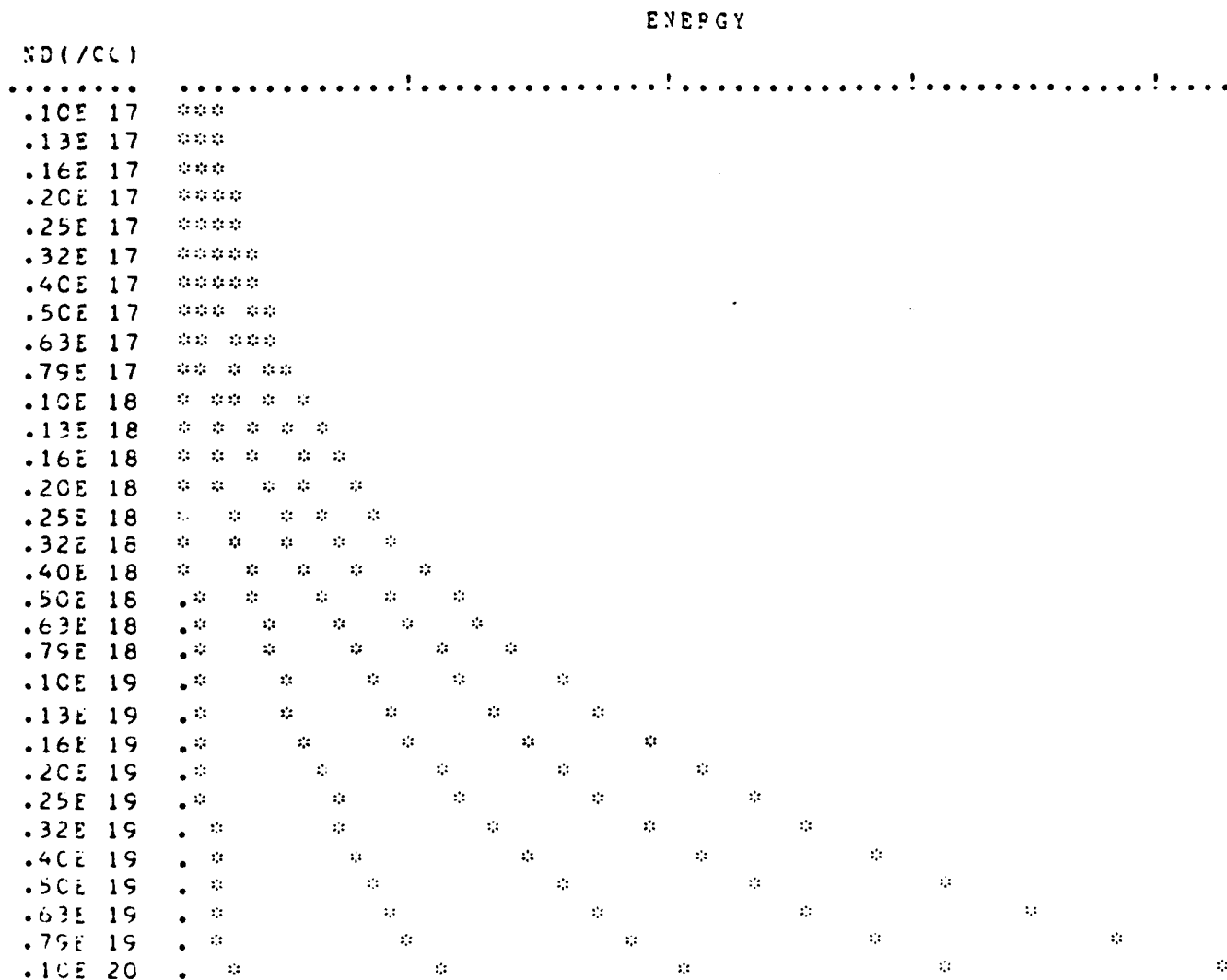


Figure 55

ND (/CC)	EC1	EC2	EC3	EC4	EC5
.1CE 17	1.771	5.773	9.871	14.010	18.172
.13E 17	1.964	6.433	11.018	15.650	20.310
.16E 17	2.176	7.167	12.294	17.477	22.694
.2CE 17	2.410	7.981	13.713	19.513	25.352
.25E 17	2.667	8.883	15.291	21.779	28.314
.32E 17	2.949	9.883	17.045	24.301	31.614
.40E 17	3.258	10.990	18.992	27.106	35.287
.5CE 17	3.557	12.214	21.153	30.225	39.376
.63E 17	3.966	13.567	23.549	33.689	43.923
.79E 17	4.369	15.061	26.205	37.537	48.979
.1CE 18	4.808	16.709	29.146	41.806	54.598
.13E 18	5.266	18.526	32.400	46.540	60.837
.16E 18	5.804	20.525	35.998	51.787	67.762
.2CE 18	6.365	22.723	39.973	57.597	75.442
.25E 18	6.971	25.137	44.359	64.026	83.954
.32E 18	7.624	27.784	49.195	71.133	93.381
.40E 18	8.327	30.684	54.521	78.983	103.814
.5CE 18	9.080	33.854	60.380	87.646	115.350
.63E 18	9.887	37.317	66.916	97.196	128.094
.79E 18	10.747	41.091	73.882	107.712	142.159
.1CE 19	11.662	45.196	81.623	119.280	157.668
.13E 19	12.632	49.659	90.095	131.989	174.750
.16E 19	13.657	54.494	99.352	145.935	193.544
.20E 19	14.736	59.726	109.450	161.215	214.196
.25E 19	15.869	65.372	120.447	177.935	236.863
.32E 19	17.053	71.453	132.401	196.202	261.706
.40E 19	18.285	77.985	145.372	216.126	288.897
.50E 19	19.563	84.983	159.416	237.822	318.611
.63E 19	20.881	92.461	174.590	261.403	351.033
.79E 19	22.237	100.427	190.948	286.984	386.347
.10E 20	23.623	108.888	208.538	314.678	424.744

Table 55

GRAPH OF ENERGY VS. ND

NG AAS

K1 = .068 K2 = .068 K3 = .068

RELATIVE PERMITTIVITY (ϵ_L) = 10.9

WC = 100.0ANGSTROMS

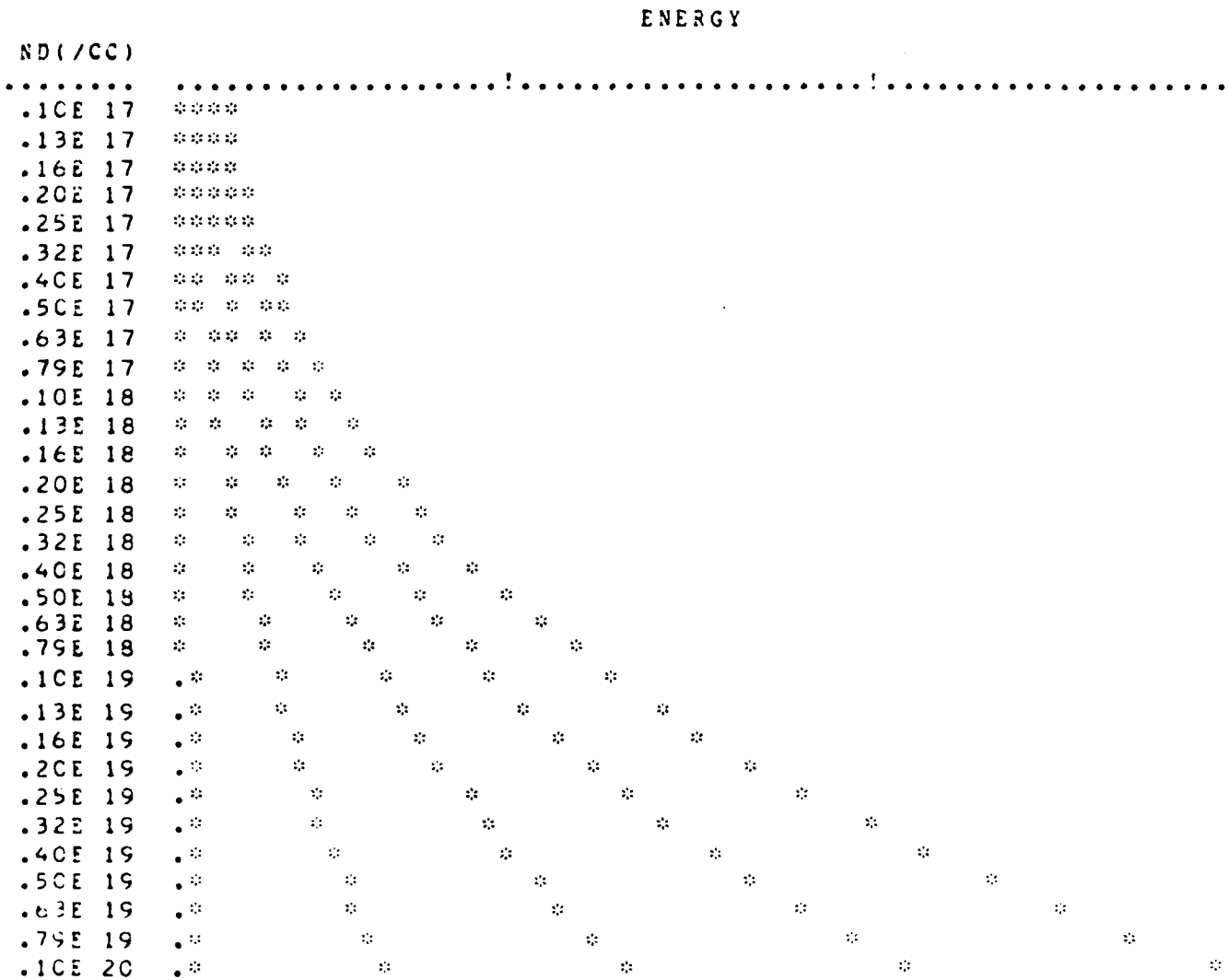


Figure 56

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.1CE 17	1.457	5.153	9.039	13.004	17.016
.13E 17	1.597	5.704	10.036	14.462	18.944
.16E 17	1.749	6.310	11.137	16.076	21.081
.2CE 17	1.913	6.975	12.351	17.860	23.448
.25E 17	2.089	7.702	13.688	19.831	26.067
.32E 17	2.278	8.498	15.158	22.005	28.963
.4CE 17	2.480	9.366	16.774	24.402	32.162
.5CE 17	2.696	10.313	18.547	27.042	35.692
.63F 17	2.925	11.344	20.489	29.945	39.585
.79E 17	3.168	12.463	22.615	33.135	43.872
.10E 18	3.425	13.675	24.938	36.634	48.589
.13E 18	3.695	14.987	27.471	40.469	53.772
.16E 18	3.979	16.403	30.230	44.664	59.461
.2CE 18	4.276	17.928	33.229	49.247	65.695
.25E 18	4.584	19.566	36.482	54.246	72.517
.32E 18	4.904	21.320	40.005	59.689	79.973
.4CE 18	5.234	23.195	43.810	65.604	88.107
.5CE 18	5.573	25.191	47.912	72.021	96.967
.63F 18	5.920	27.312	52.323	78.966	106.599
.79E 18	6.273	29.556	57.053	86.469	117.051
.10E 19	6.630	31.924	62.113	94.555	128.369
.13E 19	6.990	34.413	67.510	103.248	140.600
.16E 19	7.351	37.019	73.250	112.569	153.787
.20E 19	7.711	39.738	79.334	122.537	167.970
.25E 19	8.068	42.563	85.762	133.168	183.186
.32E 19	8.420	45.485	92.529	144.469	199.467
.40E 19	8.766	48.495	99.628	156.446	216.838
.50E 19	9.103	51.580	107.047	169.097	235.316
.63F 19	9.430	54.728	114.767	182.412	254.910
.79E 19	9.746	57.924	122.769	196.376	275.620
.1CE 20	10.050	61.154	131.026	210.963	297.432

Table 56

GRAPH OF ENERGY VS. ND

NG AAS

K1 = .068 K2 = .068 K3 = .068

RELATIVE PERMITTIVITY (EL) = 10.9

WC = 300.0ANGSTROMS

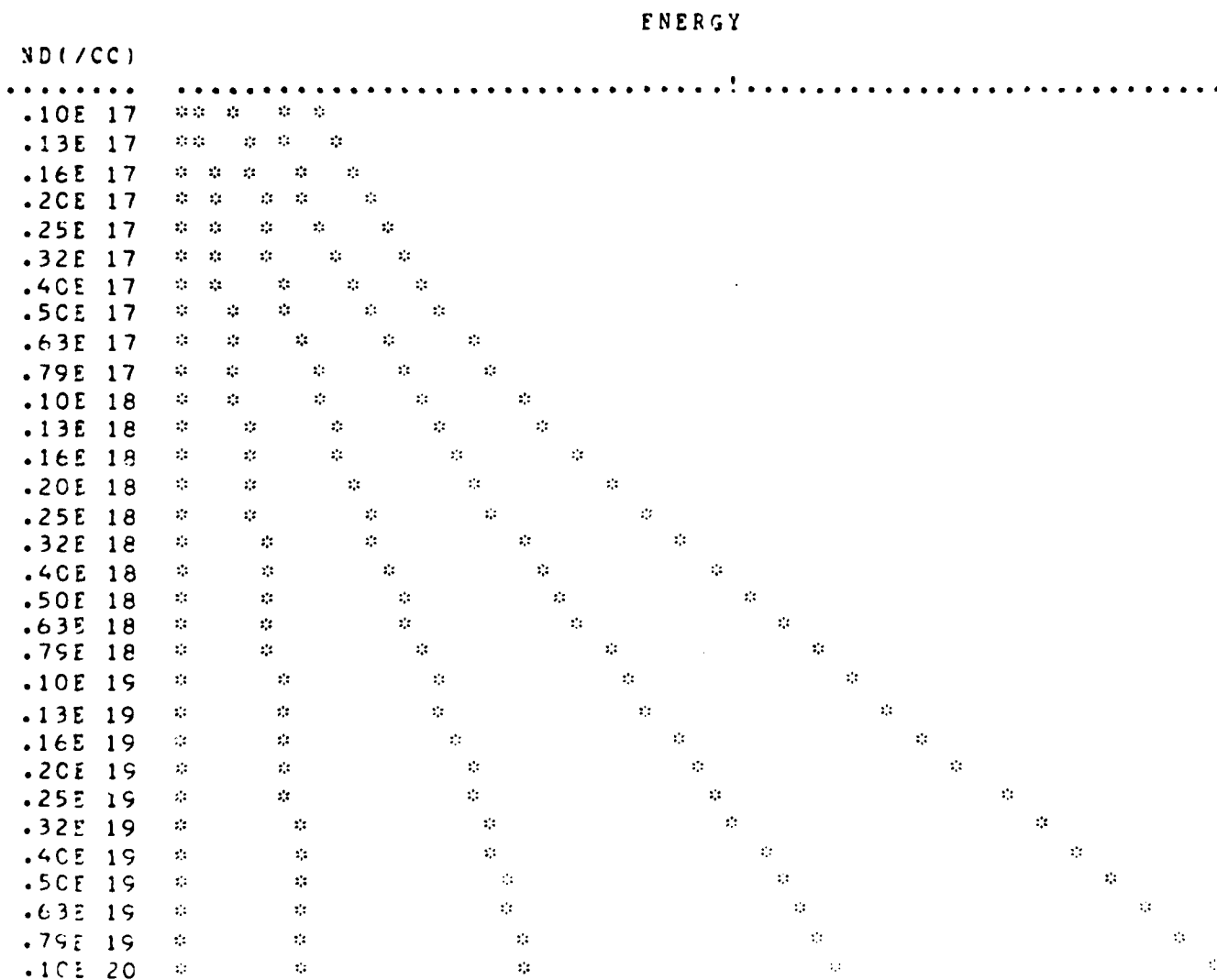


Figure 57

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.10E 17	.700	3.306	6.386	9.681	13.109
.13E 17	.740	3.570	6.951	10.585	14.375
.16E 17	.780	3.848	7.554	11.557	15.742
.20E 17	.820	4.138	8.195	12.599	17.217
.25E 17	.860	4.442	8.874	13.713	18.802
.32E 17	.900	4.756	9.591	14.900	20.503
.40E 17	.939	5.082	10.347	16.162	22.322
.50E 17	.977	5.417	11.138	17.499	24.262
.63E 17	1.015	5.761	11.966	18.911	26.326
.79E 17	1.051	6.111	12.826	20.397	28.514
.10E 18	1.086	6.466	13.718	21.954	30.825
.13E 18	1.119	6.825	14.638	23.581	33.259
.16E 18	1.152	7.186	15.582	25.273	35.812
.20E 18	1.182	7.547	16.547	27.025	38.481
.25E 18	1.211	7.905	17.529	28.831	41.258
.32E 18	1.238	8.260	18.523	30.686	44.137
.40E 18	1.264	8.608	19.524	32.581	47.107
.50E 18	1.288	8.950	20.526	34.507	50.160
.63E 18	1.310	9.282	21.525	36.456	53.281
.79E 18	1.331	9.603	22.515	38.418	56.457
.10E 19	1.350	9.913	23.491	40.383	59.673
.13E 19	1.367	10.209	24.449	42.340	62.914
.16E 19	1.383	10.492	25.383	44.279	66.162
.20E 19	1.398	10.761	26.289	46.190	69.400
.25E 19	1.412	11.014	27.164	48.063	72.612
.32E 19	1.424	11.252	28.004	49.890	75.781
.40E 19	1.435	11.476	28.806	51.661	78.890
.50E 19	1.445	11.684	29.570	53.371	81.925
.63E 19	1.455	11.878	30.292	55.012	84.871
.79E 19	1.463	12.057	30.973	56.579	87.717
.10E 20	1.471	12.222	31.611	58.069	90.450

Table 57

GRAPH OF ENERGY VS. ND

NI NP

K1 = .077 K2 = .077 K3 = .077

RELATIVE PERMITTIVITY (EL) = 14.0

WC = 300.0ANGSTROMS

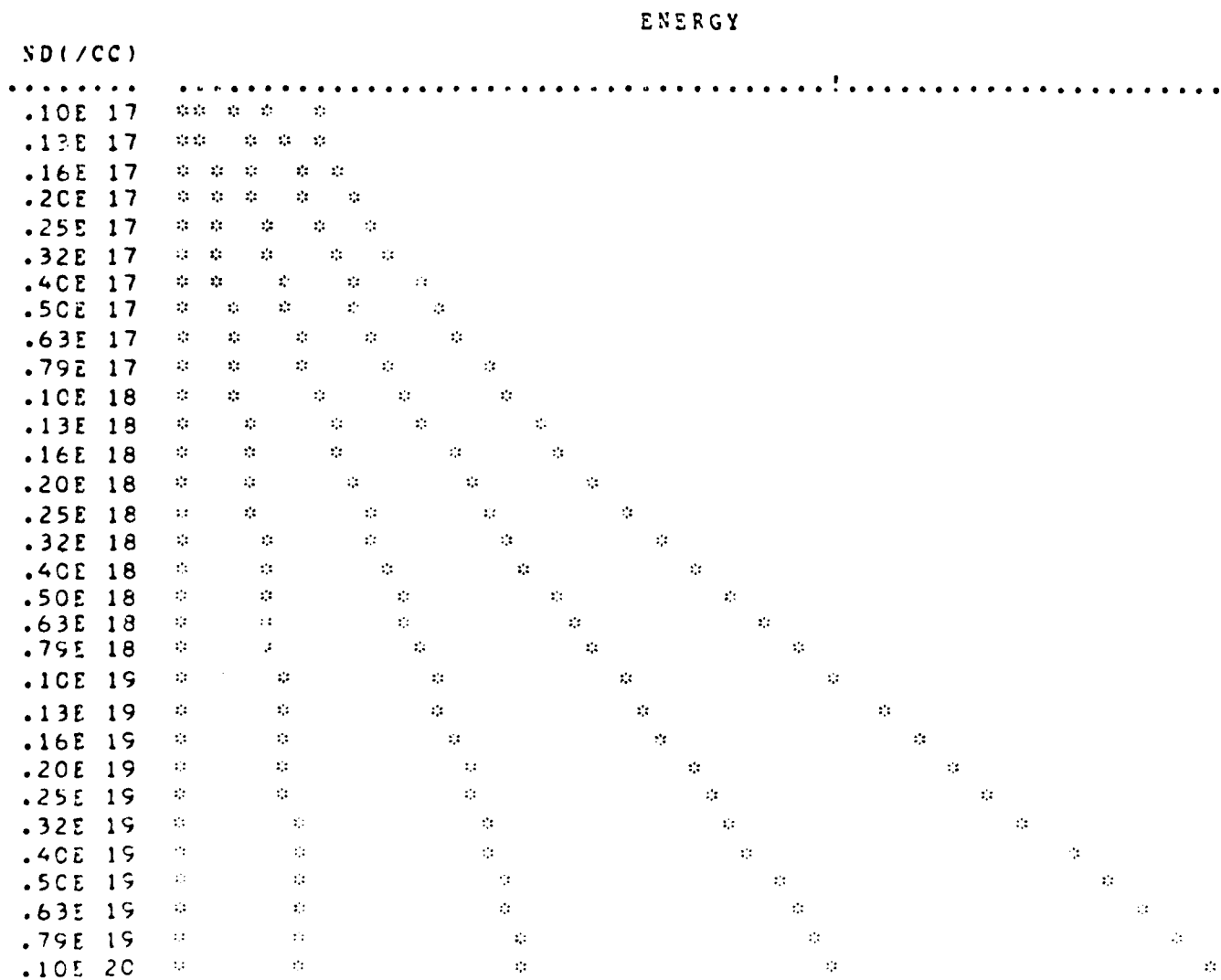


Figure 58

ND(/CC)	EC1	EC2	EC3	EC4	EC5
.1CE 17	.599	2.797	5.380	8.137	11.001
.13E 17	.634	3.024	5.861	8.904	12.072
.16E 17	.670	3.262	6.375	9.729	13.230
.2CE 17	.705	3.513	6.923	10.615	14.480
.25E 17	.740	3.775	7.504	11.564	15.826
.32E 17	.776	4.047	8.120	12.577	17.272
.40E 17	.810	4.329	8.768	13.655	18.821
.5CE 17	.845	4.621	9.450	14.800	20.476
.63E 17	.878	4.920	10.164	16.010	22.238
.79E 17	.911	5.227	10.908	17.287	24.110
.10E 18	.942	5.538	11.680	18.628	26.092
.13E 18	.973	5.854	12.479	20.031	28.182
.16E 18	1.002	6.172	13.302	21.494	30.380
.20E 18	1.029	6.491	14.145	23.013	32.681
.25E 18	1.056	6.808	15.004	24.583	35.082
.32E 18	1.081	7.124	15.877	26.198	37.576
.4CE 18	1.104	7.434	16.757	27.853	40.156
.50E 18	1.126	7.740	17.642	29.540	42.814
.63E 18	1.146	8.037	18.527	31.251	45.538
.79E 18	1.165	8.327	19.406	32.979	48.318
.1CE 19	1.183	8.606	20.276	34.714	51.141
.13E 19	1.199	8.874	21.131	36.447	53.992
.16E 19	1.214	9.131	21.967	38.169	56.859
.20E 19	1.228	9.375	22.782	39.871	59.726
.25E 19	1.240	9.606	23.570	41.545	62.577
.32E 19	1.252	9.824	24.329	43.181	65.398
.4CE 19	1.262	10.028	25.056	44.773	68.174
.5CE 19	1.272	10.219	25.749	46.314	70.892
.63E 19	1.280	10.397	26.407	47.797	73.538
.79E 19	1.288	10.562	27.028	49.217	76.101
.1CE 20	1.295	10.715	27.612	50.570	78.570

Table 58

APPENDIX I

"TWO DIMENSIONAL SUBBANDING
In
JUNCTION FIELD EFFECT STRUCTURES"*

by

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*Work supported by The Office of Naval Research under Contract
N00014-69-A-0200-4054 and current Contract N00014-76-C-1081.

ABSTRACT

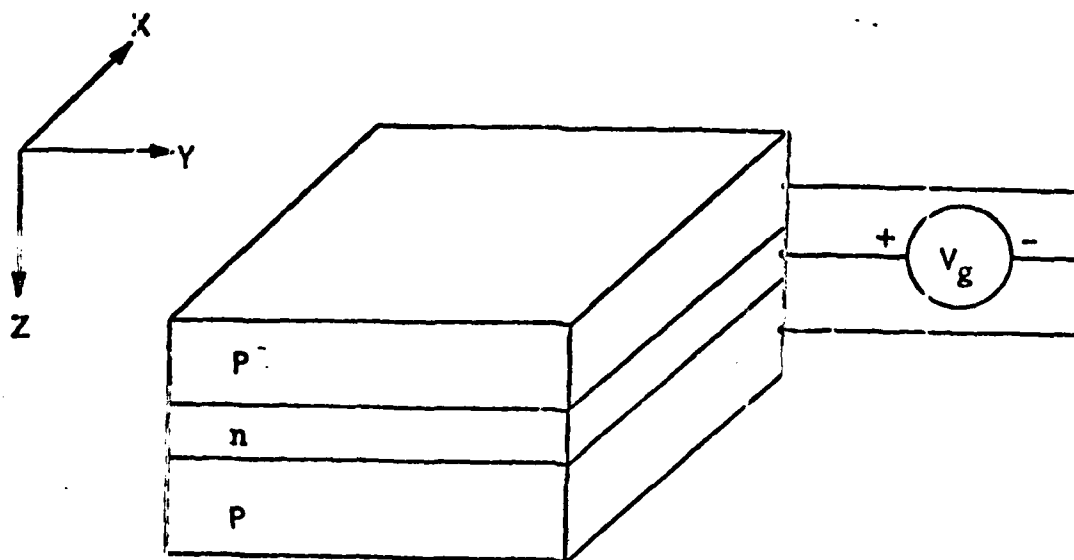
It is shown that confinement leading to substantial subbanding may be realized in the channel region of a junction field effect device. Two types of devices are considered: One having a doped surface channel the other having a doped buried channel. Useful approximate analytical expressions are presented for the values of the subband energy minima assuming a simple model for the electronic potential. The validity of these expressions are determined by comparison to a numerical calculation. Results for Si and GaAs devices are presented. The effects of a screened potential on the subband energies for a specific device are determined by numerically solving Poisson's and Schrödinger's equations. The devices appear to be interesting structures for the study of two dimensional phenomena in both the bulk and surface regions of semiconductors.

1. INTRODUCTION

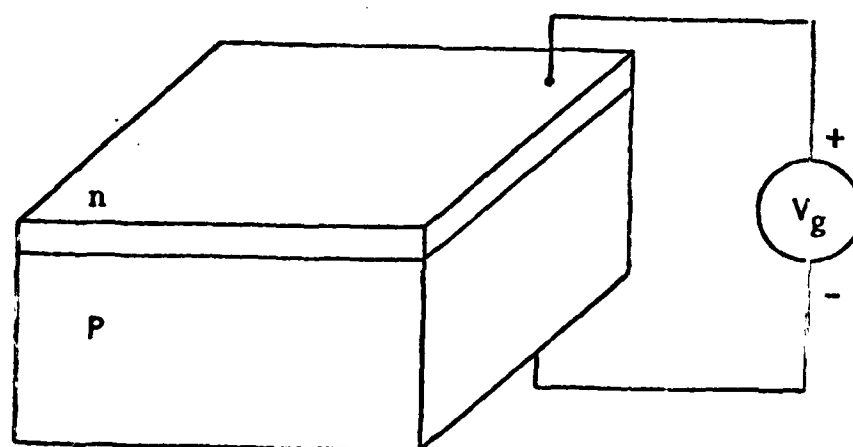
Over the past decade there has been considerable study of two-dimensional subbanding in semiconductor devices [1]. The activity has been mostly centered about inversion and accumulation layers at semiconductor surfaces. A heterojunction structure has also been proposed and studied [2]. We show here that there is another class of structures, namely the junction field-effect devices, which are expected to exhibit strong quantum effects when appropriately designed [3,4,5].

2. CALCULATION

We treat here two types of junction field-effect devices, the buried channel device (BCD) and the surface channel device (SCD). The BCD (fig. 1a) consists of a thin conducting channel sandwiched between two p-n junctions. The SCD (fig. 1b) has one p-n junction with confinement on the other side of the channel provided by the surface. In either device the degree of confinement can be adjusted by varying the gate bias V_g . The nature of the potential well seen by the electrons in a homogeneously doped n-channel device is illustrated in fig. 2. The shape of the potential well seen by the electrons in the channel of the SCD (under flat-band conditions at the surface) is obtained by bisecting the potential well of the BCD and introducing an essentially infinite barrier at the surface [1]. When the applied bias is low enough to allow a substantial amount of free electrons to remain in the channel there will be a space-charge neutral region in the center of the channel whose nominal width is denoted by W_c . When the sum of the built-in and applied biases $V_b + V_g$ is sufficient to deplete essentially all the electrons from the channel the device is said to be



(a)



(b)

Figure 1. Two idealized devices considered in the analysis having (a) a buried channel (BCD) and (b) a surface channel (SCD).

in the "pinch-off" condition.

In the presence of a confining potential $V(z)$ the one electron energies will be restricted to discrete values E_i which are determined by the one-dimensional Schrödinger equation

$$-\frac{\hbar^2}{2m_3} \frac{d^2}{dz^2} \psi_i(z) + [V(z) - E_i] \psi_i(z) = 0 \quad (1)$$

where m_3 is the appropriate effective mass for motion in the z -direction [6]. Because the potential $V(z)$ for the SCD and BCD considered here are simply related, it is sufficient to solve eq. (1) for the buried channel structure. The solutions of eq. (1) for the SCD are easily seen to correspond to the antisymmetric solutions of eq. (1) for the BCD.

We first consider a BCD having a homogeneously doped n -region with a donor concentration N_d . Assuming the depletion approximation, the confining potential $V(z)$ in the n -region is given by

$$V(z) = \begin{cases} 0 & , |z| < \frac{W_c}{2} \\ \frac{q^2 N_d}{2\epsilon_r \epsilon_0} \left(|z| - \frac{W_c}{2} \right)^2 & , \frac{W_c}{2} < |z| < \frac{W_n}{2} \end{cases} \quad (2)$$

Although the depletion approximation is equivalent to neglecting the effects of Debye screening, which is precise in the limit of zero temperature, it is useful in determining the magnitude of the quantum effects. A more precise analysis including the effects of screening is presented below.

Using the form of the potential given by eq. (2) we apply the WKB method to determine the values E_i in eq. (1). The result of this approach is

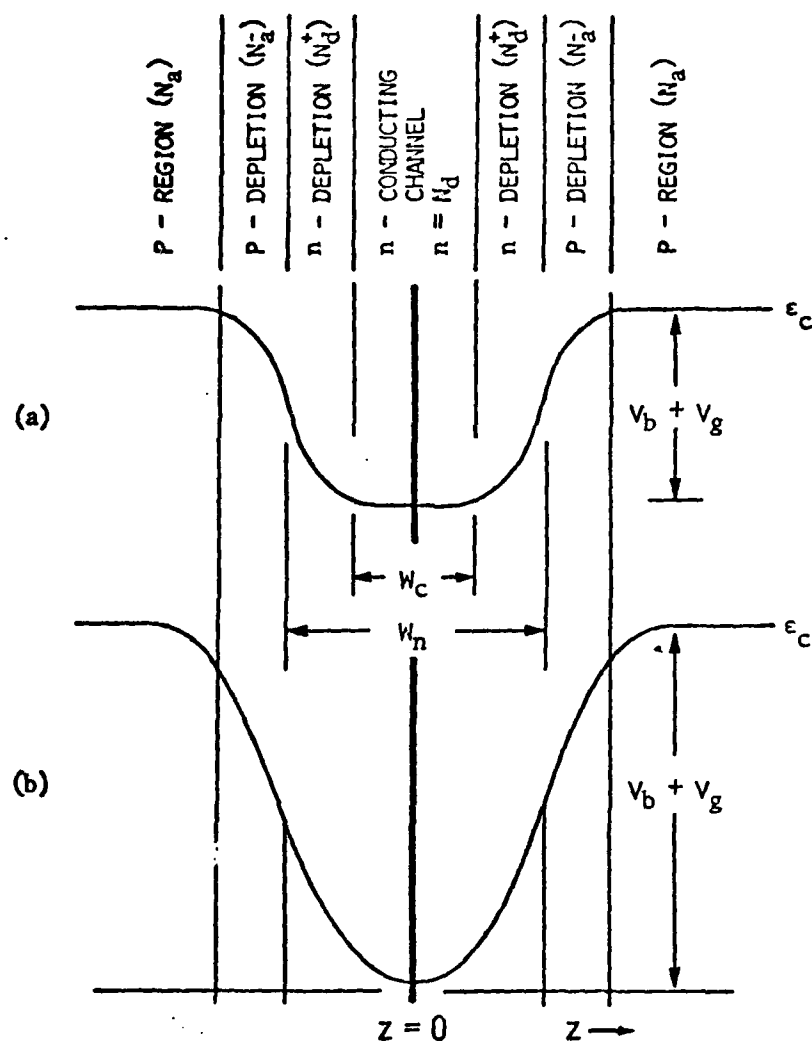


Figure 2. The potential wells for a buried channel device and a surface channel device are shown. W_c is the conducting channel width; W_n is the width of the n-region; V_b the p-n junction built-in potential; V_g the gate voltage; ϵ_c the bulk semiconductor conduction band edge; and z is the dimension in the direction of confinement. The surface channel device consists of one half the full potential well with an essentially infinite potential barrier placed at $z = 0$. (a) shows the devices for $W_c > 0$ and (b) shows the devices at pinch-off.

$$E_i = (i + \frac{1}{2}) \hbar \omega_0 + \frac{m_3 W_c^2 \omega_0^2}{\pi^2} \left\{ 1 - \left[1 + \frac{2\pi^2 (i + \frac{1}{2}) \hbar \omega_0}{m_3 W_c^2 \omega_0^2} \right]^{\frac{1}{2}} \right\} \quad (3)$$

$$i = 0, 1, 2, \dots$$

where

$$\omega_0 = \left[\frac{q^2 N_d}{\epsilon_r \epsilon_0 m_3} \right]^{\frac{1}{2}} .$$

It is noted that at pinch-off ($W_c = 0$) the potential of eq. (2) has a parabolic shape and the Hamiltonian becomes that of the simple harmonic oscillator. Under these conditions the energies predicted by eq. (3) reduce to the familiar values for the energy of the simple harmonic oscillator

$$E_i = (i + \frac{1}{2}) \hbar \omega_0 . \quad (4)$$

For the SCD, the subband energies E_i may also be determined from eq. (3) where the value of W_c used in eq. (3) is understood to be equal to twice the actual surface channel width and where only odd values of i are allowed. This means that for a given channel doping concentration, the SCD would be expected to display twice the subband separation of the BCD at pinch-off. For $W_c > 0$ the subband separation for the SCD is still larger than the subband separation for the BCD due to the increased confinement created by the surface.

The Fermi level E_F for this subbanding system may be determined by considering the expression for the conservation of free carriers. The carrier concentration for the i th member of the j th subband set is

$$n_{ij} = \alpha_j P_{ij} \quad (5)$$

where the density of states is [6]

$$\alpha_j = \frac{4\pi}{h^2} n_j (m_{1j} m_{2j})^{\frac{1}{2}} \quad (6)$$

with n_j being the valley degeneracy, and where the occupation probability is [6]

$$P_{ij} = kT \ln[e^{-(E_{ij} - E_F)/kT} + 1] \quad (7)$$

The total density of carriers for the case under consideration is

$$n_{TOT} = \sum n_{ij} = N_d W_c \quad (8)$$

where N_d is the ionized donor density in the conducting channel [7].

Conservation of free carriers yields

$$\prod_{ij} \left\{ [e^{-(E_{ij} - E_F)/kT} + 1]^{\alpha_j} \right\} = e^{N_d W_c / kT} \quad (9)$$

The Fermi level is found by numerical solution of eq. (9).

Figs. 3 through 6 show E_i^{WKB} for $i = 0, 1, 2, 3$ and E_F as a function of W_c for n-GaAs and n-Si BCDs at various homogeneous channel doping concentrations. Several observations may be made from these figures:

1. The subband energy edge is strongly dependent on N_d .
2. The subband energy edge drops rapidly with W_c .
3. The adjacent subband separations for $W_c > 0$ increase for increasing quantum number i (in contrast to the results for MOS devices).
4. The two dimensional channel may be strongly degenerate with the Fermi level penetrating several subbands (e.g., see fig. 6).

These observations are easily understood. Larger values of N_d cause the potential to have a steeper slope in the space charge region thereby resulting in a higher degree of confinement and hence higher subband energies. The increasing separation of adjacent subband minima with increasing quantum number i for $W_c > 0$ occurs due to the similarity of the well to that of a "particle in a box." The increase in the Fermi

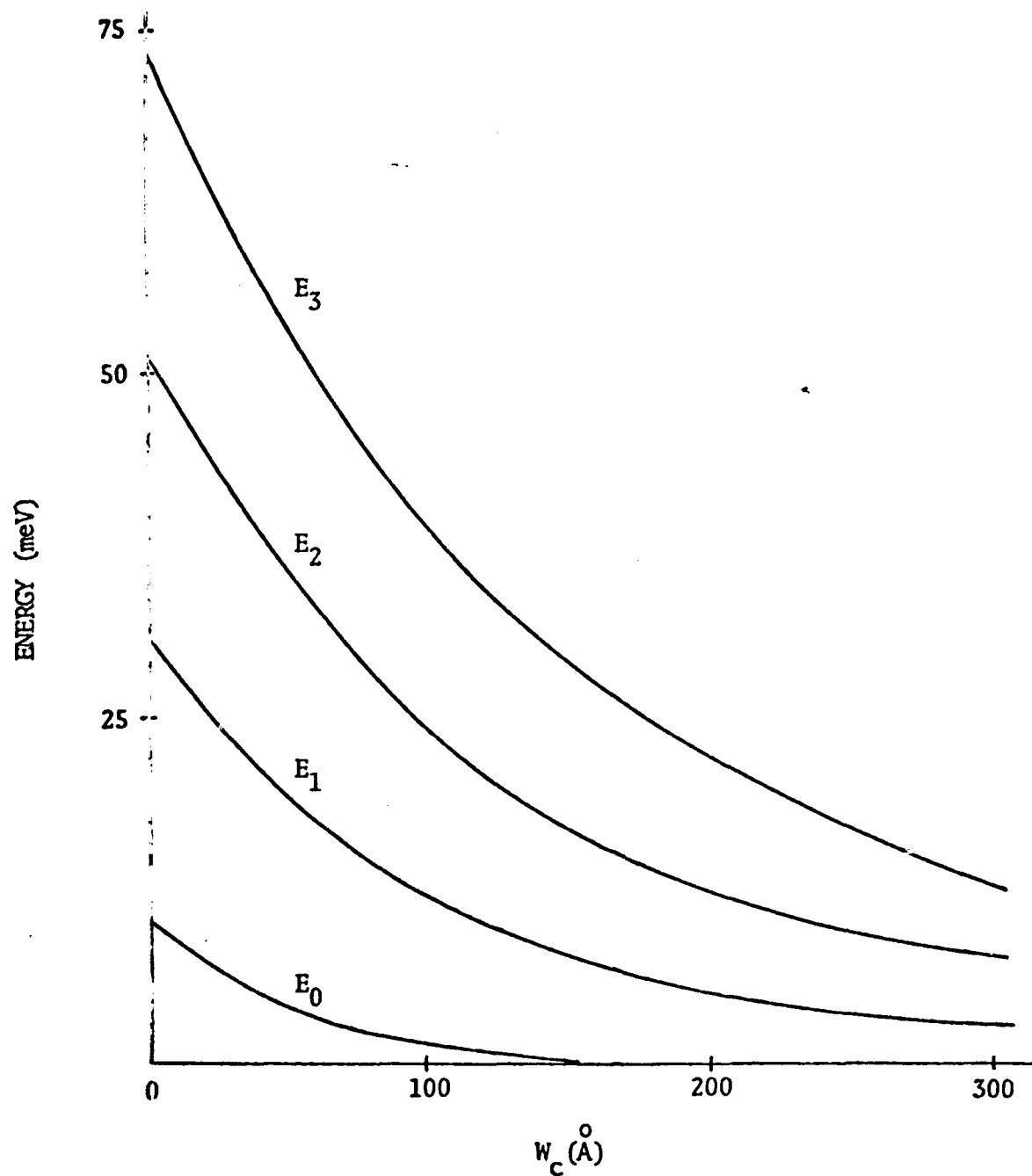


Figure 3. The first four subband valley minima vs. W_c for a (111) Si BCD doped with 10^{18} cm^{-3} donors. The system is non-degenerate at 300K.

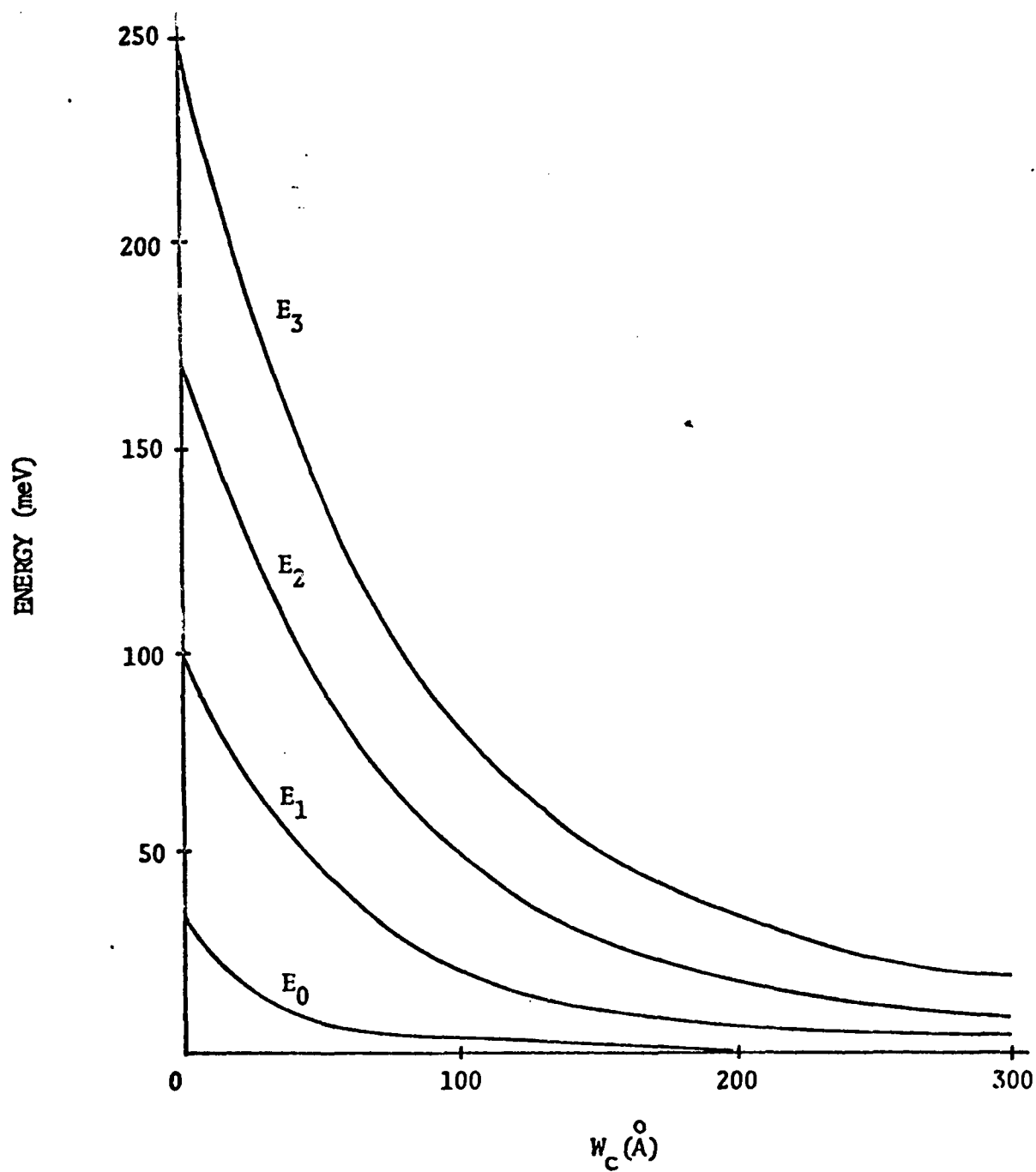


Figure 4. The first four subband valley minima vs. W_c for a (111) Si BCD doped with 10^{19} cm^{-3} donors. The system is non-degenerate at 300K.

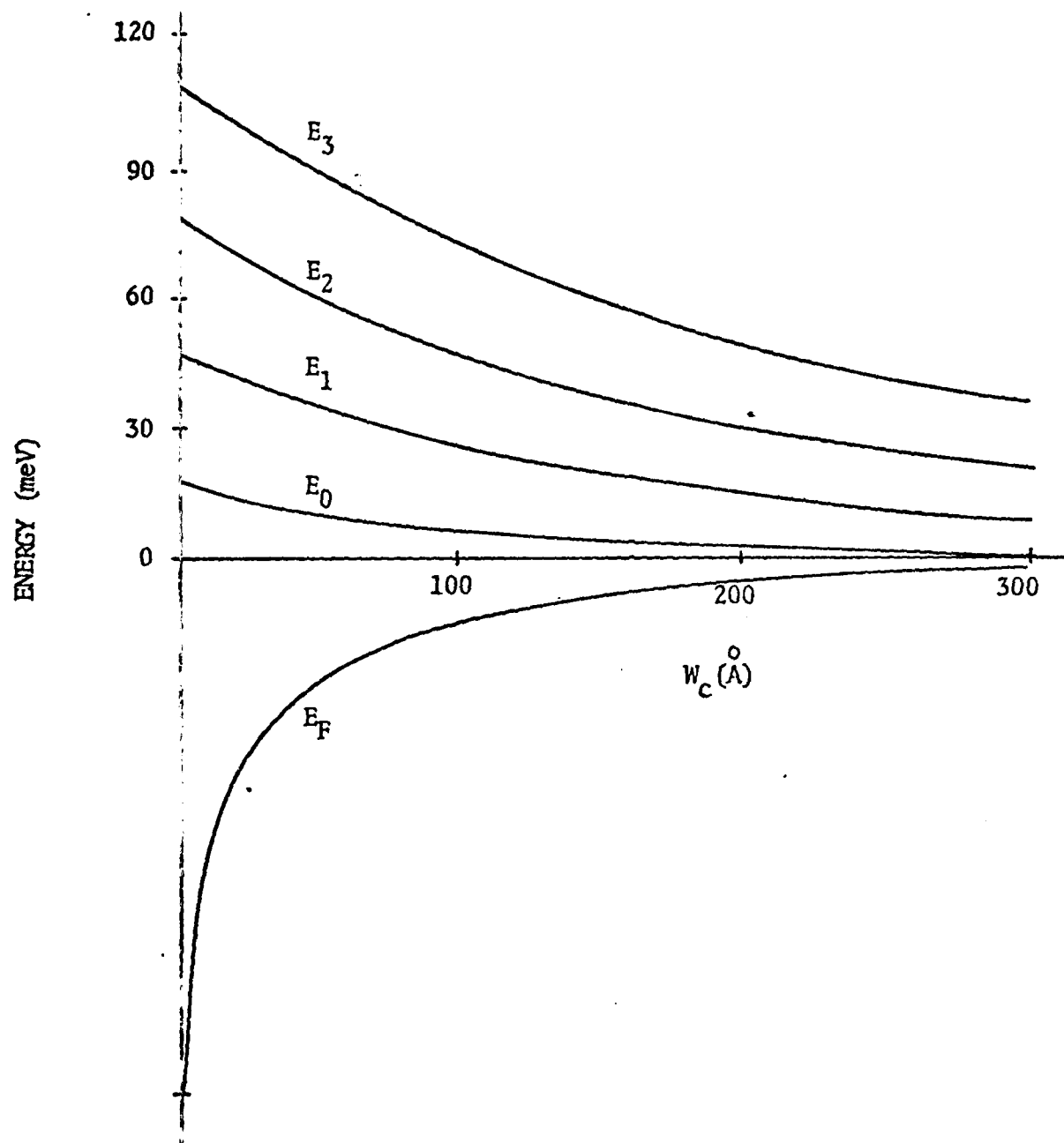


Figure 5. The first four subband valley minima and the Fermi energy vs. W_c for a GaAs BCD doped with $5 \times 10^{17} \text{ cm}^{-3}$ donors. The system is non-degenerate at 300K.

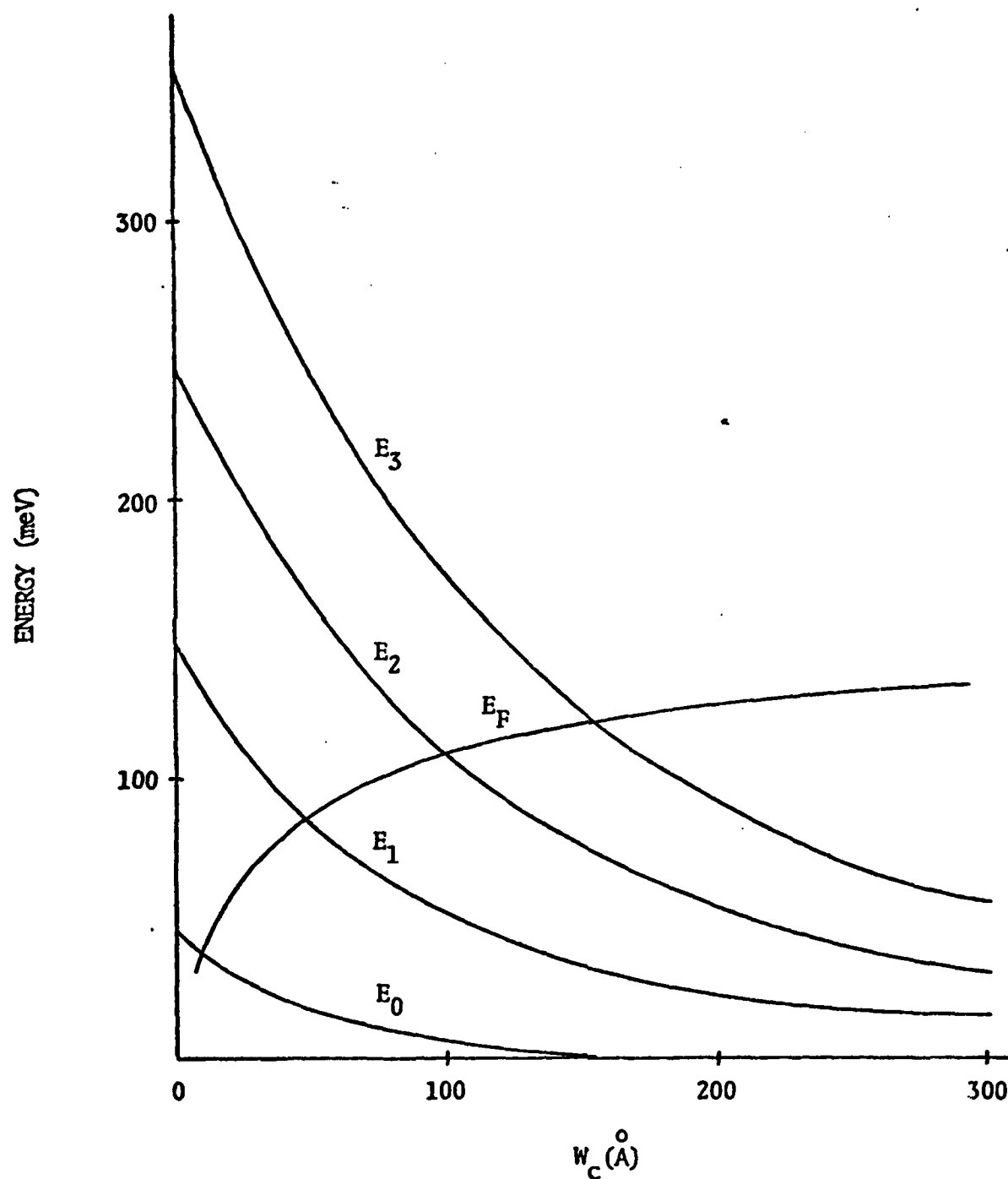


Figure 6. The first four subband valley minima and the Fermi level vs. W_c for a GaAs BCD doped with $5 \times 10^{18} \text{ cm}^{-3}$ donors. The system is strongly degenerate at 300K and at larger channel widths.

level with increasing W_c is a direct result of the low density of states in each subband and the linear increase in the electron concentration per unit area with increasing W_c which is expressed by [7]

$$n = N_d W_c \quad (10)$$

A numerical analysis has been performed for the solution of eq. (1) using the potential described by eq. (2) to test in the present case the validity of the WKB approach. Results for (111) n-Si with $N_d = 10^{18} \text{ cm}^{-3}$ and $m_3 = 0.258 m_0$ are shown in Table I. One observes that as the channel widens some error appears in the value for E_0^{WKB} . The error in the upper subbands decreases rapidly with increasing quantum number i . This is consistent with the semiclassical nature of the WKB approximation.

A better approximation to the ground state energy is provided by the Rayleigh-Ritz technique. The trial function was chosen to be

$$\psi(z) = \begin{cases} (z^2 - \alpha^2)^2, & |z| \leq \alpha \\ 0, & |z| > \alpha \end{cases} \quad (11)$$

where α is the variational parameter. The resulting ground state energy in terms of the dimensionless parameter C is given by

$$E_0^{\text{VAR}} = \frac{m_3 \omega_0^2 W_c^2}{8} \left[-\frac{1}{11} C^{-2} - \frac{63}{128} C^{-1} + 1 - \frac{105}{128} C + \frac{48 \hbar^2}{m_3^2 \omega_0^2 W_c^4} C^2 + \frac{21}{64} C^3 - \frac{9}{64} C^5 + \frac{5}{128} C^7 - \frac{7}{2816} C^9 \right] \quad (12)$$

where

$$C = \frac{W_c}{2\alpha} \quad (13)$$

lies on the interval (0,1) and is a root of the polynomial

TABLE I

$E_i^{\text{WKB}}/E_i^{\text{num}}$ for $N_d = 10^{18} \text{ cm}^{-3}$, $m_3 = 0.258 m_0$ - (111) Si.

$w_c (\text{\AA})$

i	0	60	120	180	240
0	0.998	1.2227	1.5378	1.8252	2.0423
1	0.9981	0.9842	1.0004	1.0425	1.0923
2	0.9970	0.9983	0.9901	0.9894	0.9997
3	0.9959	0.9968	0.9981	0.9933	0.9902

$$\begin{aligned}
& \frac{1}{11} - \frac{63}{256} C + \frac{105}{256} C^3 - \frac{48 A^2}{m_3^2 \omega_0^2 W_c^4} C^4 - \frac{63}{128} C^5 \\
& + \frac{45}{128} C^7 - \frac{35}{256} C^9 + \frac{63}{2816} C^{11} = 0.
\end{aligned} \tag{14}$$

For $W_c = 0$, $E_0^{\text{VAR}} = \sqrt{12/11} \frac{1}{2} \hbar \omega_0$ which is approximately 4.5% higher than the exact value. Comparison with the numerical results indicates that the error in the Rayleigh-Ritz result decreases with increasing values of W_c .

As mentioned above, the transition between the conducting channel and the depletion region is not abrupt at finite temperatures. To include the effects of screening exactly one must solve Poisson's equation for the electrostatic potential and Schrödinger's equation for the charge distribution self-consistently. Since such a solution requires very lengthy numerical procedures we employ here a less complicated approach which approximates the effects of screening on subband minima energies. The approximation consists of calculating the shape of the potential well assuming a three dimensional conduction band and a Boltzman distribution of carriers [8]. The resulting potential is then used to numerically calculate the subband minima energies. The subband energies calculated using this analysis on a specific device are displayed in Table II and compared to the subband energies for the unscreened potential. One observes that the inclusion of the screening in the analysis results in significantly higher subband energy minima for gate voltages below pinch-off. This effect occurs due to the smearing of charge at the edge of the conducting channel which gives rise to a rounding and effective narrowing of the potential well. At $V_g = 3.0V$, which under the depletion approximation corresponds to the pinch-off condition, one observes that the screened values are

TABLE II

Subband Energy Minima (meV) for a BCD: With screening; (kKB);
and [Rayleigh-Ritz]. $W_n = 960\text{\AA}$, $m_3 = 0.190 m_0$, $T = 300\text{K}$, $N_d = 10^{18}\text{cm}^{-3}$.

	V_g (Volts)			
i	0.0V	1.0V	2.0V	3.0V
0	1.32 (0.22) [0.62]	3.50 (0.70) [1.45]	7.98 (3.47) [4.70]	10.53 (12.30)
1	4.75 (1.84)	11.5 (5.22)	25.1 (17.3)	32.3 (36.3)
2	9.68 (4.81)	21.1 (12.51)	43.5 (34.0)	56.0 (61.5)
3	16.05 (8.91)	31.9 (21.7)	62.4 (52.1)	79.2 (86.1)
4	23.90 (14.0)	43.5 (32.2)	82.0 (71.15)	102.6 (111.0)

lower than the unscreened values. This is because with the more exact analysis some free electronic charge remains in the channel even at $V_g = 3.0V$. These remaining electrons compensate some of the ionic charge leading to a decrease in the steepness of the potential well.

3. CONCLUSION

We have shown that strong quantum effects are to be expected in appropriately designed J-FET structures. The effects are strongest at high channel doping concentrations and for semiconductors having a low effective mass. The SCD exhibits larger quantum effects than the BCD. A BCD has the advantage of being far from the semiconductor surface and is not dependent upon the availability of suitable insulators.

Although the channel free carrier concentration decreases with increasing confinement, substantial subband separation and carrier concentration (cm^{-2}) are simultaneously achievable. For example, a GaAs n-channel device having a donor concentration of $5 \times 10^{18} cm^{-3}$ and a channel width of 100\AA will contain 5×10^{12} electrons cm^{-2} . Under these conditions the separation of the lowest two subbands will be 42.4 meV for the buried channel device and 68.3 meV for the surface channel device.

The magnitude of the subband separations appears to be adequate for experimental investigations using the transport and optical techniques which have been successfully employed in studying MOSFETs. Fabrication of BCD's and SCD's appears to be within the scope of current semiconductor device technology.

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